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Topic 1. YOU HAD YOUR GENOME SEQUENCED AND FOUND SOMETHING – NOW WHAT?

Important for the subject: Science and Technology

In recent decades, genomics and the use of genetic information in healthcare have undergone significant transformations.

- Once limited to major research centers, personal genome sequencing has become widely accessible, empowering individuals with detailed knowledge of their genetic makeup.

Advantage of Advancements in Sequencing Technologies

- **Reduced Costs:** The affordability of genome sequencing, particularly due to advancements in next-generation sequencing, has democratized access to genetic information.
- **Population-Wide Projects:** This accessibility has spurred large-scale initiatives aiming to use genetic data for healthcare improvements, including population-scale whole genome sequencing.

Benefits of Personal Genome Sequencing

- **Tailored Treatments:** Personal genome sequencing enables customized treatments based on individual genetic profiles and predicts susceptibility to specific diseases.
- **Incidental Findings:** Comprehensive genetic tests often reveal additional genetic abnormalities beyond their initial purpose, known as incidental or secondary findings.

Various Guidelines and Recommendations on Incidental Findings

- **ACMG Recommendations:** In 2013, the American College of Medical Genetics and Genomics recommended disclosing certain incidental findings from whole exome or genome sequencing that could benefit individuals.
- **Expanding List of Conditions:** The ACMG has expanded its list of reportable conditions, with the latest version including 97 disorders and 81 genes related to cardiovascular, metabolic disorders, and cancer.

Prevalence and Impact of Incidental Findings

- **Population-Scale Studies:** Studies in various populations, including the Indian population, have revealed the prevalence of underdiagnosed diseases like cardiac channelopathies and familial hypercholesterolemia.
- **Significance of Findings:** While there is evidence supporting the medical benefits of disclosing incidental findings, their population-scale impact remains limitedly understood.

Iceland's Genetics Research Approach

- **Iceland's Unique Demographics:** Iceland's historical demographic isolation and early initiation of population-level genome sequencing have made it a focal point in genetics research.
- **Research on Lifespan and Genetic Variants:** A study in Iceland suggested that actionable incidental genetic variants could potentially improve lifespan, with significant findings related to cancer-related genotypes.

Prospects of Genome Sequencing and Healthcare

- **Increasing Accessibility:** As genome sequencing becomes more accessible and affordable, regular population-scale sequencing and newborn sequencing initiatives are becoming more feasible.
- **Benefits for Population Health:** Widespread implementation of these programs could provide medically actionable insights, enabling proactive and effective disease treatment and prevention.

Topic 2. XPOSAT: ISRO'S X-RAY EYE IN THE SKY

Important for the subject: Science and Technology

The **Indian Space Research Organisation** has launched **XPoSat**, short for 'X-ray Polarimeter Satellite'.

- During the mission, the **PSLV Orbital Experimental Module-3 (POEM-3) experiment** was executed to meet the objective of 10 other payloads.

About XPoSat:

- The satellite will study **X-rays** emitted by phenomena in space and their polarization from the earth-orbit.
- **XPoSat** is the **first dedicated scientific satellite** from the **ISRO** to carry out research in space-based **polarisation measurements of X-ray emission** from **celestial sources**.
- It carries **two payloads**, namely **POLIX (Polarimeter Instrument in X-rays)** and **XSPECT (X-ray Spectroscopy and Timing)**.
- **POLIX** (developed by Raman Research Institute (RRI) Bengaluru) will study **X-rays with energy 8-30 keV** emitted by around 40 astronomical sources in five years.
- **XSPECT** (Space Astronomy Group of URSC, Bengaluru) will study **X-rays with energy 0.8-15 keV** and track changes in continuous X-ray emissions.

About X-rays:

- **X-rays** are **electromagnetic radiation** whose wavelength is **0.01-10 nanometres** (where

1 nanometre is one-billionth of a metre), corresponding to energies of **100-100,000 electron-volt (eV)**.

- **Electromagnetic radiation** is characterised by an **electric field** and a **magnetic field** vibrating perpendicular to each other.
- The **polarisation of electromagnetic radiation** refers to the **orientation of these two fields as the radiation moves through space**.
- **X-rays** can be polarised when they get **scattered**. **Polarised X-rays** are also produced when the **path of a fast-moving charged particle** is **bent by a magnetic field**.

Significance of the mission:

- Studying these **X-rays** can reveal which way the **magnetic field is pointing**, and tracking how these **X-rays** evolve in time can reveal many things about the body producing such fields, like a pulsar

Topic 3. RESEARCH UNDERWAY TO PRODUCE BIOETHANOL AND BIOHYDROGEN FROM SILKWORM-REARING WASTE

Important for the subject: Science and Technology

The **Central Sericultural Research and Training Institute (CSRTI)** in **Mysuru** has taken up a pilot-scale project to **produce bioethanol and biohydrogen from mulberry shoots and silkworm excrement**.

- The studies at **CSRTI** assume significance in the wake of the **government of India's plans** to step up the **blending of bioethanol with petrol** as part of the efforts to reduce dependence on fossil fuels.
- During **silkworm rearing**, the **larvae** consume **mulberry leaves** and leave behind the **shoot** and its **litter**. Currently, more than 10 lakh tonnes of **mulberry shoots** and a couple of thousand tonnes of **silkworm litter** are generated annually in India.
- The **mulberry shoot** and **silkworm litter** contain **more than 50 per cent cellulose**, which is the **raw material for the production of biorefineries**.
- These can be used for the production of **2G second-generation bioethanol and biohydrogen**.

Ethanol:

- **Ethanol** or **ethyl alcohol (C₂H₅OH)** is a clear colourless liquid, it is **biodegradable**, **low in toxicity** and causes **little environmental pollution** if spilt. Ethanol burns to produce **carbon dioxide** and **water**.
- Ethanol is a **high-octane fuel** and has replaced **lead** as an **octane enhancer** in **petrol**. By blending ethanol with gasoline we can also **oxygenate the fuel mixture** so it burns more

completely and **reduces polluting emissions**.

- The most common **blend** is **10% ethanol** and **90% petrol (E10)**. Vehicle engines require **no modifications** to run on **E10** and **vehicle** warranties are unaffected also. Only **flexible fuel vehicles** can run on up to **85% ethanol** and **15% petrol blends (E85)**.

Bioethanol, derived from crops, offers several benefits compared to conventional fuels:

- Sourced from **renewable crops**, it's **not reliant on finite resources** (like cereals, sugar beet, and maize).
- **Reduces greenhouse gas emissions** as fuel crops absorb **CO₂** during growth, aiding in cutting emissions from road transport, which contributes significantly to overall emissions.
- **Blending bioethanol with petrol** extends the **lifespan of dwindling oil supplies**, ensuring **better fuel security** and **reducing reliance on oil-producing nations**.
- Boosts the **rural economy** by promoting the cultivation of necessary crops. **Biodegradable** and **less toxic** than fossil fuels, contributing to environmental preservation.
- When used in older engines, it reduces carbon monoxide emissions, thereby enhancing air quality.
- Easily integrates into the existing road transport fuel system without requiring engine modifications, allowing for **blending of up to 5%** with conventional fuel.
- Produced using familiar fermentation methods, it can be distributed through existing petrol forecourts and transportation systems.

Topic 4. IIT-DELHI PROJECT LOOKS TO MAKE BIOTHERAPEUTICS MORE ACCESSIBLE

Important for the subject: Science and Technology

Biologic drugs used to treat cancer and other auto-immune disorders are often beyond the reach of patients, due to their **high prices**. But IIT-Delhi has developed a platform that strikes at one of the key reasons for the high price—manufacturing.

- IIT Delhi has developed a platform which tries to shift the manufacturing of drugs from batch to continuous Manufacturing process thereby reducing cost significantly.

Batch Process vs. Continuous Process

- Batch manufacturing is a manufacturing process in which a **specific quantity of a product is produced in a single production run**. Then, the equipment is cleaned and prepared for the next production run.
- Manufacturers use **batch manufacturing for products made in small quantities or**

requiring a high level of customization. As a result, batch manufacturing provides more process control.

- On the other hand, **continuous manufacturing is continuous and ongoing rather than divided into discrete batches.**
- In continuous manufacturing, raw materials are fed into the mixers at one end of the production process, and final products emerge from the other end.
- Manufacturers often use **continuous manufacturing for high-volume production, requiring top-level consistency and quality control.**

What is a biologic drug (biologics)?

- A biologic drug (biologics) is a product that is **produced from living organisms or contain components of living organisms.**
- Biologic drugs include a wide variety of products derived from human, animal, or microorganisms by **using biotechnology.**
- Types of biologic drugs include **vaccines, blood, blood components, cells, allergens, genes, tissues, and recombinant proteins.**
- Biologic products may contain **proteins** that control the action of other proteins and cellular processes, genes that control production of vital proteins, modified human hormones, or cells that produce substances that suppress or activate components of the immune system.
- Biologic drugs are sometimes referred to as **biologic response modifiers** because they change the manner of operation of natural biologic intracellular and cellular actions.

What are biologics used for?

- Biologic drugs are used for **treatment of numerous diseases and conditions**, and are the most advanced therapies available.
- Some biologic drugs are used for the treatment of Crohn's disease, ulcerative colitis, rheumatoid arthritis, and other **autoimmune diseases.**
- Available biologics have **revolutionized cancer treatment, delayed or reversed the course of immune related conditions**, changed the lives of people with rare diseases, and have offered hope for many patients who previously had no effective treatment options for their condition.
- Examples of **medical uses for biologic drugs include: Various cancers, Rheumatoid arthritis (RA), Ankylosing spondylitis, Crohn's disease etc.**

Topic 5. HOW RADIOCARBON DATING REVOLUTIONISED SCIENCE

Important for the subject: Science and Technology

The technology allowed scholars a clearer and measurable view of the past, clarifying the history of human migration, the rise and fall of civilisations, and undulations of the earth's climate.

- Radiocarbon Dating is a method by which the **age of an object can be determined**. This technique involves a method that does this using radiocarbon, a name for the isotope **carbon-14**.

Process of Carbon-14 formation

- It is **created in the earth's atmosphere when cosmic rays– energetic streams of charged particles coming from sources in outer space – slam into the atoms of the gases and release neutrons**.
- When these neutrons interact with the nitrogen-14 isotope, they can produce carbon-14. Since cosmic rays are ceaselessly passing through the earth's atmosphere, carbon-14 is created constantly there.
- It readily combines with atmospheric oxygen to form radioactive carbon dioxide. This compound then enters the bodies of plants (via photosynthesis), animals (when they consume plants), and other biomass through the carbon cycle.
- It is in the form of carbon dioxide and other carbon compounds, would have to be able to diffuse into the earth's various ecosystems such that the concentration of carbon-14 in the atmosphere was comparable to the concentration of carbon-14 in the planet's other biospheres.

Radiocarbon dating Working Process

- When an **organic entity – like the human body – is 'alive', it constantly exchanges carbon** with its surroundings by breathing, consuming food, defecating, shedding skin, etc.
- Through these activities, carbon-14 is both lost from the body as well as replenished, so its **concentration in the body is nearly constant and in equilibrium with its surroundings**.
- When this individual dies, the body no longer performs these activities and the concentration of carbon-14 in the body begins to dwindle through radioactive decay.
- The more time passes, the more the **amount of carbon-14 lost**, and the less there will remain. This decay rate can be predicted from theory.
- Radiocarbon dating **dates an object by measuring the amount of carbon-14 left**, which

scientists and/or computers can use to calculate how long ago the body expired.

- The modern radiocarbon dating setup is more sophisticated and one of the most sensitive dating setups uses **accelerator mass spectrometry (AMS)**, which can work with organic samples as little as 50 mg.

Topic 6. ANOTHER EYE IN THE SKY, ON GROUND: INDIA IS NOW PART OF THE WORLD'S LARGEST RADIO TELESCOPE PROJECT.

Important for the subject: Science and Technology

India will now also be part of the international mega-science project, the Square Kilometer Array Observatory (SKAO), that will function as the world's largest radio telescope.

- **ISRO** Monday launched a unique observatory to study X-rays and black holes in deep space and the stage is being set to construct the third node of the LIGO in Maharashtra.
- India, through the **Pune-based National Centre for Radio Astrophysics (NCRA)** and some other institutions, has been involved in the development of SKA since its inception in the 1990s.
- The **Department of Atomic Energy** announced plans to construct the third node of the US-based **Laser Interferometer Gravitational Wave Observatory (LIGO)** in **Hingoli district of Maharashtra**.
- The Government's approval for joining the project, with a financial sanction of Rs **1,250 crore**, is the first step towards the ratification

About Square Kilometer Array Observatory (SKAO):

- **Intergovernmental:** SKAO was established as an intergovernmental organization in 2021 following years of negotiation in which India, too, participated. Countries have to sign, and ratify, the SKAO convention to formally become members.
- Member countries include **Australia, Canada, China, India, Italy, New Zealand, South Africa, Sweden, the Netherlands, UK, Portugal and Spain**.
- Square Kilometer Array Observatory SKAO is headquartered at the **Jodrell Bank Observatory in the United Kingdom**.
- These are aimed at advancing the **scope of astronomical observations for improving the overall understanding of the universe and its evolution**.
- India's main contribution to the SKA is in the **development, and operation, of the Telescope Manager element**, the "**neural network**" or the software that will make the telescope work.

What is neural networks:

- Neural networks, also known as artificial neural networks (ANNs) or simulated neural

networks (SNNs), are a subset of machine learning and are at the heart of deep learning algorithms.

- Their name and structure are inspired by the human brain, mimicking the way that biological neurons signal to one another.

About Square Kilometer Array Telescope (SKA):

- **Location:** It is located in **Meerkat National Park, Africa** and **Murchison Radio Astronomy Observatory, Australia**.
- **Intergovernmental:** It is an **intergovernmental radio telescope project**.
- **Establishment:** The **Square Kilometer Array (SKA)** was **originally conceived in 1991**. However, an international working group was set up in
- **Objective:** The SKA will combine the signals received from **thousands of small antennas spread** over a distance of several thousand kilometres to simulate.
- A single giant radio telescope capable of extremely high sensitivity and angular resolution. This is done using a technique called aperture synthesis.

About gravitational waves:

- **Gravitational wave research is one of the most promising fields for scientific discovery.**
- **Gravitational waves refers to ripples in space-time which are caused by violent and energetic processes in the Universe.**
- **Gravitational waves were first predicted by Albert Einstein in his General Theory of Relativity in 1916.**
- **The first detection of gravitational waves by the two existing LIGO detectors in the US won the Nobel Prize in Physics in 2017.**

About LIGO:

- **LIGO stands for “Laser Interferometer Gravitational-wave Observatory”.** It is the world’s largest gravitational wave observatory and a marvel of precision engineering. It comprises **two enormous laser** interferometers located 3000 kilometers apart.
- LIGO exploits the **physical properties of light and of space** itself to detect and understand the origins of gravitational waves (GW).

LIGO-INDIA:

- **LIGO-India** is a collaboration between the **LIGO Laboratory (operated by Caltech and MIT)** and three institutes in India:
- the **Raja Ramanna Center for Advanced Technology (RRCAT, in Indore)**, the **Institute for Plasma Research (IPR in Ahmedabad)**, and the **Inter-University**

Centre for Astronomy and Astrophysics (IUCAA, in Pune).

- LIGO-India received the **Indian Government's in-principle approval in February 2016**. The LIGO-India project will be built by the **Department of Atomic Energy (DAE) and the Department of Science and Technology (DST)**, Government of India.
- With a Memorandum of Understanding (MoU) with the **National Science Foundation (NSF), USA**, along with several national and international research and academic institutions.
- LIGO India will be the **all-important fifth detector**. When it begins operation, LIGO India will **significantly improve the likelihood that four detectors** are operating at any given moment.
- This is the critical role that LIGO India will play in the **global gravitational wave detector network**.

About NCRA:

- NCRA is a unit of the **Tata Institute of Fundamental Research**. It operates **India's largest network of radio telescopes** called the **Giant Metrewave Radio Telescope (GMRT)**.
- It is the success of building and operating **GMRT that landed NCRA** this responsibility with the SKA.

About GMRT:

- **GMRT is the world's largest and most sensitive** radio telescope operating within the 110-1,460-Megahertz frequency range.
- The GMRT Observatory is located in **Pune (near Khodad)**. This unique telescope has studied **pulsars, supernovae, quasars, galaxies** and its **observation time has always remained oversubscribed**.
- **GMRT in 2021 became only the third in India** to be recognised with the **Institute of Electrical and Electronics Engineers (IEEE) Milestone facility**.
- In June 2023, GMRT was among the **six top radio telescopes** used to enable the detection of the **nano-hertz gravitational waves for the first time**.

Topic 7. MEET ISRO'S NEW X-RAY EYE IN THE SKY

Important for the subject: Science and Technology

About XPoSat its component and its significance:

XPoSat, India's X-ray Polarimeter Satellite launched by **ISRO**, represents a significant leap in the study of **polarized cosmic X-rays**, aimed at unravelling the mysteries surrounding **celestial phenomena** such as **black holes, neutron stars, and active galactic**

nuclei.

- The payload includes **POLIX (Indian X-ray Polarimeter)**, developed at **Raman Research Institute (RRI)**.
- Despite its relatively **compact size** of approximately **0.5 meters** and **200 kilograms**, this instrument stands out for its **indigenous design**, focusing on **detecting the polarization of X-rays in space**.
- Understanding **X-ray polarization** is crucial, particularly in **stars** boasting **colossal magnetic fields** like **pulsars** and **regions adjacent to black holes**, where the intricate interplay of matter and energy emits **X-rays** with **distinct properties**.
- **POLIX's** innovative use of a **beryllium disc** enables the **study of lower-energy X-rays** compared to previous instruments, amplifying the breadth of knowledge acquisition in this domain.
- Accompanying **POLIX** on **XPoSat** is **XSPECT**, another instrument tailored to **scrutinize the timing and spectral characteristics of X-ray-emitting cosmic entities**.
- The **limitations** in focusing **X-rays** due to their **high energy** and the **Earth's atmosphere absorbing most cosmic X-rays** necessitate **space-based telescopes** like **XPoSat** for in-depth observations.
- **XPoSat's mission** signifies **India's shift from satellite deployment to planetary exploration**, highlighted by recent missions like **Chandrayaan-3** and **Aditya-1**, while also emphasizing collaborations with global space agencies like **NASA**.

Imaging X-ray Polarimetry Explorer (IXPE or SMEX-14) by NASA:

- It was only in **December 2021** that the **first** instrument to study **X-rays** in space (**IXPE**) was launched into space by **NASA** and the **Italian Space Agency (ASI)**.
- This instrument **contains gas**, whose **atoms are stripped of electrons** after interacting with incoming **X-rays**. Upon scrutiny, the direction of motion of these ejected electrons gives clues to the X-ray polarisation.

Key terms:

- **Pulsars:** A pulsar (from pulsating radio source) is a highly magnetized rotating neutron star that emits beams of electromagnetic radiation out of its magnetic poles.
- **Black hole:** A black hole is a region of spacetime where gravity is so strong that nothing, including light and other electromagnetic waves, has enough energy to escape it.
- **Active galactic nuclei:** An **active galactic nucleus (AGN)** is a **compact region** at the **centre of a galaxy** that **emits a significant amount of energy across the electromagnetic spectrum**, with characteristics indicating that the **luminosity is not**

produced by stars.

- Such **excess, non-stellar emissions** have been observed in the **radio, microwave, infrared, optical, ultra-violet, X-ray and gamma ray wavebands**.
- A galaxy hosting an **AGN** is called an **active galaxy**. The **non-stellar radiation** from an **AGN** is theorized to result from the **accretion of matter** by a **supermassive black hole** at the **centre of its host galaxy**.
- **X-rays:** X-rays are a form of **electromagnetic radiation**, similar to **visible light**. Unlike light, however, **x-rays have higher energy** and can **pass through most objects**, including the **body**.

Topic 8. FROM THE MOON TO EUROPA, SIX SPACE MISSIONS TO BE EXCITED FOR IN 2024

Important for the subject: Science and Technology

The year 2023 proved to be an important one for space missions, with NASA's OSIRIS-REx mission returning a sample from an asteroid and India's Chandrayaan3 mission exploring the lunar south pole region, and 2024 is shaping up to be another exciting year for space exploration.

Six Major Mission for 2024

Europa Clipper: Unveiling Jupiter's Moon Europa

- **Mission Context:** NASA's Europa Clipper aims to explore Europa, one of Jupiter's largest moons, known for its icy surface and potential subsurface saltwater ocean.
- **Scientific Goals:** The mission will conduct close flybys to study Europa's ice shell, geology, and subsurface ocean, seeking signs of habitability.
- **Launch Window:** Scheduled for October 10, 2024, with 21 days, aboard a SpaceX Falcon Heavy rocket.

Artemis II: NASA Plan To Return to the Moon

- **Program Background:** Artemis II is part of NASA's Artemis program, aiming to send humans back to the moon and establish a sustained presence for future Mars missions.
- **Mission Details:** Artemis II will carry four astronauts on a 10-day mission orbiting the Moon, building upon the uncrewed Artemis I mission.
- **Launch Timeline:** Planned for as early as November 2024, with potential delays to 2025.

VIPER: Searching for Lunar Water

- **Mission Purpose:** VIPER, a golf cart-sized rover, will explore the moon's south pole to search for water and other volatiles.

- **Technical Challenges:** The mission will navigate extreme lunar temperatures and shadowed regions during its 100-day mission.
- **Launch Schedule:** Set for November 2024, following a delay for additional lander system tests.

Lunar Trailblazer and PRIME-1: Water Mapping and Drilling

- **SIMPLEx Missions:** As part of NASA's low-cost planetary missions, Lunar Trailblazer will orbit the moon to map water locations, while PRIME-1 will test drilling technology.
- **Launch Dependencies:** Both missions are secondary payloads, with their launch timing contingent on the readiness of primary payloads.

JAXA's Martian Moon eXploration (MMX) Mission

- **Mission Focus:** MMX aims to study Mars' moons, Phobos and Deimos, to determine their origin and collect a sample from Phobos.
- **Scientific Objectives:** The mission will spend three years conducting science operations around Mars and its moons.
- **Launch Plan:** Scheduled for around September 2024.

ESA's Hera Mission: Asteroid Defense Study

- **Mission Context:** Hera will follow up on NASA's DART mission to the Didymos-Dimorphos asteroid system, where DART tested the kinetic impact technique for planetary defense.
- **Research Goals:** Hera will study the physical properties of the asteroids and assess the impact of the DART collision.
- **Launch and Arrival:** Set for October 2024, with arrival at the asteroid system expected in late 2026.

Topic 9. 50% OF CYBERCRIME PLAINTS ORIGINATE IN CHINA, POCKETS OF CAMBODIA AND MYANMAR

Important for the subject: Science and Technology

Around 50% of cybercrime complaints received on the national cybercrime helpline every day have their origin in China and pockets of Cambodia and Myanmar.

Various Initiatives Regarding Cyber Security

National Cyber Security Policy:

- This policy aims to build a **secure and resilient cyberspace for citizens**, businesses, and the government.

- It outlines various objectives and strategies to protect cyberspace information and infrastructure, build capabilities to prevent and **respond to cyber attacks, and minimise damages through coordinated efforts** of institutional structures, people, processes, and technology.

Cyber Surakshit Bharat Initiative:

- This initiative was launched to **raise awareness about cyber crimes and create safety measures for Chief Information Security Officers (CISOs)** and frontline IT staff across all government departments.

Indian Cyber Crime Coordination Centre (I4C):

- This centre was established to provide a framework and **eco-system for law enforcement agencies to deal with cyber crimes in a comprehensive and coordinated manner.**
- It has seven components, namely: National Cyber Crime Threat Analytics Unit, National Cyber Crime Reporting Portal, National Cyber Crime Training Centre, Cyber Crime Ecosystem Management Unit, National Cyber Crime Research and Innovation Centre, National Cyber Crime Forensic Laboratory Ecosystem, Platform for Joint Cyber Crime Investigation Team.

Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre):

- This centre was launched in 2017 to create a secure cyberspace by detecting **botnet infections** in India and notifying, enabling cleaning and securing systems of end users to prevent further infections.

Computer Emergency Response Team – India (CERT-In):

- It is an organisation of the Meit Y which **collects, analyses and disseminates information on cyber incidents, and also issues alerts on cyber security incidents.**

Critical information infrastructure (CII):

- It is defined as a computer resource, the destruction of which, shall have debilitating impact on national security, economy, public health or safety.
- The government has **established the National Critical Information Infrastructure Protection Centre (NCIIPC) to protect the CII of various sectors, such as power, banking, telecom, transport, government, and strategic enterprises.**

Defence Cyber Agency (DCyA):

- The DCyA is a **tri-service command of the Indian Armed Forces that is responsible for handling cyber security threats.**
- It has the capability to conduct cyber operations, such as hacking, surveillance, data recovery, encryption, and countermeasures, against various cyber threat actors.

IT searches, a form of extra-constitutional power

Important Highlights:

- The 2017 Supreme Court decision affirmed the **fundamental right to privacy** but hasn't significantly impacted the interpretation of related statutes.
- **Section 132 of the Income Tax Act grants broad powers to tax authorities, allowing searches without judicial warrants.**
- Recent incidents, like a lawyer's raid, raise concerns about the abuse of these powers and the lack of safeguards.
- It focuses on the **unchecked power granted to tax authorities** under Section 132 of the Income Tax Act, highlighting the need for proportionality and stricter judicial review in executive actions.

Major Issues:

- The persistence of a culture of **judicial deference** to executive authority in interpreting statutes. The broad and unchecked powers granted to tax authorities under Section 132 of the Income Tax Act.
- **Lack of proportionality and strict judicial review** in executive actions, risking potential abuse of power.

Right to Privacy Judgement

- The Supreme Court described privacy and its importance in the landmark decision of K.S. Puttaswamy v. Union of India in 2017 that – Right to Privacy is a fundamental and inalienable right and attaches to the person covering all information about that person and the choices that he/ she makes.
- The right to privacy is protected as an intrinsic part of the right to life and personal liberty under Article 21 and as a part of the freedoms guaranteed by Part III of the Constitution.

Restrictions (as stated in the Judgement):

- The right may be restricted only by state action that passes each of the three tests: First, such state action must have a legislative mandate.
- Second, it must be pursuing a legitimate state purpose, and Third, it must be proportionate i.e., such state action- both in its nature and extent, must be necessary in a democratic society and the action ought to be the least intrusive of the available alternatives to accomplish the ends.

Topic 10. PM OPEN LAKSHADWEEP OPTICAL FIBRE CONNECTION

Important for the subject: Science and Technology



PM inaugurates **Kochi-Lakshadweep Islands Submarine Optical Fibre Connection**

The **KLI-SOFC** project, a **Submarine Optic Fibre Cable** connection to **Lakshadweep**, marks a significant advancement, promising faster and more reliable internet services.

- **Total link distance:** 1,868 kilometres.
- It has the potential to transform communication infrastructure, enabling telemedicine, e-governance, education, digital banking, and more.
- The initiative **aims** to boost Lakshadweep's development, enhancing services like healthcare, education, and digital banking while strengthening its potential as a logistics hub.
- The government pledges ongoing support for the people of Lakshadweep, aiming for improved living standards, travel convenience, and business opportunities, envisioning a developed India.

Background:

- In the **Kochi-Lakshadweep Islands Submarine Cable (KLI)** project submarine cable connectivity from **Mainland (Kochi)** to **eleven Lakshadweep Islands** namely
- Kavaratti, Agatti, Amini, Kadmat, Chetlat, Kalpeni, Minicoy, Androth, Kiltan, Bangaram and Bitra has been extended.
- The project is funded by the **Universal Services Obligation Fund (USOF)**, Department of Telecommunication.

- **Bharat Sanchar Nigam Limited (BSNL)** was the Project Executing Agency.

Benefits of the KLI Project:

- It will play a significant role in achieving the objective of ‘**Digital India**’ and ‘**National Broadband Mission**’ and in rolling out various **e-governance projects of the Government of India in Lakshadweep Islands**.
- **E-Governance, Tourism, Education, Health, Commerce and Industries** will get a boost. High-speed broadband will be provided through FTTH and 5G/4G Mobile networks.

Optical Fibre Communication:

- **Fibre-optic communication** is a **method of transmitting information from one place to another** by sending **pulses of infrared or visible light** through an optical fibre.
- The light is a form of carrier wave that is modulated to carry information. Fibre is preferred over electrical cabling when high bandwidth, long distance, or immunity to electromagnetic interference is required.
- This type of communication can transmit voice, video, and telemetry through local area networks or across long distances.

Topic 11. CO A PLANET’S ATMOSPHERE COULD INDICATE HABITABILITY

Important for the subject: Science and Technology

An international team led by the University of Birmingham (UK) and MIT (USA), developed a ‘**habitability signature**.’

- The findings published in Nature Astronomy introduce a **practical method for habitability detection**. Past attempts to identify **habitable planets** lacked certainty about **liquid water’s existence**. **Comparing CO₂ levels** among planets helps identify those likely to support life due to oceans.
- Earth’s **CO₂** dissolved in the ocean, enabling life support for about four billion years. Analyzing **CO₂ levels** on other planets reveals insights into **Earth’s environmental tipping points**.
- **High carbon levels** on **Venus** might have led to its **uninhabitable state** despite similarities to Earth.
- **Carbon dioxide** in a planet’s atmosphere absorbs **infrared light**; this measurement aids **habitability assessment**.
- **Planets in the habitable zone** (not too hot or cold relative to their star) could **retain liquid water on their surface**.
- **Lower carbon dioxide levels** in a planet’s atmosphere compared to

its **neighbours** suggest **potential liquid water presence**.

- **Reduction in carbon dioxide levels** might indicate **gas absorption by an ocean** or **isolation by planetary biomass**.
- The team's '**habitability signature**' could also act as a **biosignature**, as living organisms capture CO₂.

Topic 12. A FIRST IN 100 YEARS, INDIAN SCIENCE CONGRESS POSTPONED

Important for the subject: Science and Technology

The **109th edition of the Indian Science Congress** event which was scheduled on January 3rd, 2024 has been postponed.

- Because of the disruption caused by Covid pandemic, **the Indian Science Congress 2021 and 2022** could not take place.
- In the **108th edition of the event in 2023**, the Prime Minister Narendra Modi could only make an online appearance at the inaugural event.
- Starved of funds, ISCA decided to shift the venue from **Lucknow University to Lovely Professional University (LPU)**
- The Centre since 2015 has been promoting the **India International Science Festival (IISF)**

Reasons for discontinuance:

- Disagreement between the **Indian Science Congress Association (ISCA)**, organizer of the event and the **Department of Science and Technology (DST)**, its main funder.
- In September last year, the DST withdrew its funding support to ISCA citing "**financial irregularities**".

About Indian Science Congress (ISC)

- It is the annual gathering of researchers in the country. It is organized by the **Indian Science Congress Association (ISCA)**.
- The **first meeting** of the Congress was held from **January 15-17, 1914** at the premises of the **Asiatic Society, Calcutta**,
- There are now fourteen sections namely **Agriculture and Forestry Sciences, Animal, Veterinary and Fishery Sciences, Anthropological and Behavioural Sciences, Chemical Sciences, Earth System Sciences, Engineering Sciences, Environmental Sciences, Information and Communication Science & Technology, Material Sciences, Mathematical Sciences, Medical Sciences, New Biology, Physical Sciences, Plant Sciences and one Committee Science & Society**

About Indian Science Congress Association (ISCA)

- It is a premier scientific organization of India with **headquarters at Kolkata, West Bengal**.
- The Indian Science Congress Association (ISCA) owes its origin to the foresight and initiative of two British Chemists namely **Professor J. L. Simonsen and Professor P.S. MacMahon**.
- It is an **independent professional body** functioning under the **Department of Science and Technology (DST)**. The association is aiming at making **people aware** about the recent developments in **Science & Technology and its impact on society**.

About India International Science Festival (IISF)

- IISF is a collaborative endeavor between the **Ministry of Science and Technology, Ministry of Earth Sciences, Department of Space and Department of Atomic Energy** in partnership with **Vijnana Bharati**.
- IISF's primary objective is to **commemorate the world of science, making it accessible to all**. The first IISF was celebrated in **New Delhi in 2015**.

Topic 13. INDIA TO LAUNCH G20 SATELLITE ON SPACE X FALCON 9 ROCKET

Important for the subject: Science and Technology

New Space India Ltd (NSIL), the ISRO's commercial arm has announced its plans to launch communication satellite **GSAT-20** on **SpaceX's Falcon-9 rocket**.

- The launch is likely to take place in the **second quarter of 2024**. **NSIL** was mandated to build, launch, own and operate satellites in "**Demand-driven mode**" for meeting service needs of the user.
- **NSIL** successfully undertook its **1st Demand-driven satellite mission, GSAT-24** during June 2022. This will be **India's first partnership** with a venture led by billionaire **Elon Musk** to bring his **Starlink** satellite broadband to India.

About GSAT-20:

- **GSAT-20** (renamed as **GSAT-N2**) is a high throughput **Ka-band satellite**.
- **GSAT-20 satellite** will be fully owned, operated and funded by **NSIL**.
- **Ka-band satellites** deliver **high-speed broadband internet connectivity** and digital video and audio transmission.
- The **K_a band** is a portion of the **microwave part of the electromagnetic spectrum** defined as frequencies in the **range 26.5–40 gigahertz**, i.e. **wavelengths from slightly over one centimeter down to 7.5 millimeters**.
- **GSAT-20** offers **Ka-band HTS capacity** with **32 beams** having **pan-India**

coverage including in Andaman and Nicobar and Lakshadweep islands

- **GSAT 20** will be **2nd Demand driven communication satellite** mission of **NSIL** after **GSAT24**.
- The satellite has been specifically designed to meet the demanding service needs of **remote/unconnected regions**. **GSAT-20** satellite through the **ISRO** and will be launched onboard **Falcon-9** under a launch service contract between the **NSIL** and the **Space X, USA**.
- According to **NSIL Chairperson Radhakrishnan Durairaj** **Demand-driven** mode basically means we need to have an anchor customer who is ready to lease the entire capacity.
- **NSIL** is the **commercial arm of Indian Space Research Organisation (ISRO)** with the primary responsibility of enabling.
- Indian industries to take up **high technology space related activities** and is also **responsible for promotion and commercial exploitation** of the products and services emanating from the Indian space

About Space X's Falcon-9 rocket

- **Falcon 9** is a **reusable, two-stage rocket** designed and manufactured by **Space X**. It is aimed at **reliable and safe transport of people and payloads into Earth orbit** and beyond.
- **Falcon 9** is the **world's first orbital class reusable rocket** which allows **SpaceX** to re-fly the most expensive parts of the rocket, which in turn drives down the cost of space access

Topic 14. ARCELORMITTAL PARTNERS WITH IIT MADRAS TO CREATE ASIA'S FIRST HYPERLOOP FACILITY

Important for the subject: Science and Technology

ArcelorMittal has established a partnership with the **Indian Institute of Technology Madras (IIT Madras)** to develop **Hyperloop Technology** in Tamil Nadu. ArcelorMittal is collaborating with the **IIT Madras's Hyperloop Technology teams (Avishkar Hyperloop)** and **TuTr Hyperloop**, a startup incubated in IIT Madras, for this project.

- The Ministry of Railways is also a key partner to this project. The team's central objective is the **advancement and commercialisation of Hyperloop technologies** for high-speed, affordable, reliable, and sustainable transportation.
- The partnership for **hyperloop deep-tech initiative** which will significantly accelerate our efforts to commercialize Hyperloop technology

About Hyperloop technology:

- **Hyperloop is a proposed high-speed transportation system** for both public and goods transport.
- The technology is proposed by **Elon Musk**, who is behind electric car company **Tesla** and commercial space transport company **SpaceX**. Hyperloop systems have three essential elements: **tubes, pods, and terminals**.
- **The tube** is a large, sealed low-pressure system (usually a long tunnel). **The pod** is a coach pressurized at atmospheric pressure that experiences low air resistance or friction inside this tube using magnetic propulsion.
- **The terminal handles** pod arrivals and departures.
- The **Hyperloop high-speed infrastructure system** will transport passengers and goods at aircraft speeds in pods through a **low-pressure, vacuum tube**, cutting journey times by 90 percent.
- The technology provides significantly **more benefits to traditional transportation modes** – sea, rail, road, and air – by offering energy-efficient, on-demand, and cost-effective service, while reducing the overall footprint of the system.
- An agreement was signed between **Maharashtra government and Virgin group** to build a Hyperloop connecting **Mumbai and Pune in Maharashtra**.
- A committee chaired by **NITI Aayog Member V K Saraswat** is exploring the **technological and commercial viability of the Virgin Hyperloop technology in India**.

Topic 15. RESEARCHERS ENGINEER PLANT CELLS TO PRODUCE DRUG FOR CANCER

Important for the subject: Science and Technology

Researchers from **IIT Madras** and **Mandi** worked on **enhancing the production of the anti-cancer drug camptothecin (CPT) by metabolically engineering plant cells**.

- The decline in this plant's population prompted the exploration of alternative sources. **IIT Madras** researchers identified a **microbe** as a **sustainable CPT source** and developed a **metabolic model** for **N. nimmoniana cells**.
- They **aim** to enable **efficient commercial drug production**, reducing the need to exploit endangered plants.
- The **team** is funded by **SERB** and the **Department of Science and Technology**.
- The process involves **cultivating plant cells in the lab**, engineering them for **increased CPT production**, and **navigating regulatory approval** for **genetically modified cell lines**. However, optimization at the **bioreactor level** is pending.

Significance of developing the novel process:

- The **importance** of this research lies in providing a **sustainable method for CPT production**, given its **significance in chemotherapy**.
- This work not only focuses on **CPT** but also sets a platform for enhancing the production of other valuable plant-derived compounds.
- The collaborative effort between these institutions emphasizes the potential of model-based **metabolic engineering** in understanding and boosting the production of essential **phytochemicals**.

About Camptothecin (CPT):

- It is a potent **topoisomerase inhibitor** discovered in **1966** from the **Camptotheca acuminata** tree in **China**.
- Initially used in **traditional Chinese medicine**, it exhibited promising **anticancer properties** in clinical trials, particularly against **various cancers** like **breast, ovarian, colon, lung, and stomach**.
- Despite its **therapeutic potential**, challenges such as **low solubility** and **adverse effects** led to the development of **synthetic versions and derivatives**.
- **CPT** has been discovered in other plants, such as **Chonemorpha fragrans**. Currently, this drug is derived from the **endangered Nathapodytes nimmoniana** plant, requiring **massive amounts of plant material**.
- **Camptothecin's current extraction** mainly occurs in **Southeast Asia**, where the plant is **critically endangered**.

Topic 16. NEW CLASS OF ANTIBIOTICS THAT CAN KILL DRUG-RESISTANT BACTERIA FINALLY ON THE HORIZON?

Important for the subject: Science and Technology

F Hoffmann-La Roche AG found a **new antibiotic class** effective against **gram-negative bacteria** after a five-decade drought in new classes.

- **Zosurabalpin**, the **antibiotic**, shows promise against **drug-resistant Acinetobacter strains** in mice and is undergoing human trials. Two related **macrocylic peptide molecules** are also in development.
- **World Health Organization** classified **CRAB (carbapenem-resistant Acinetobacter baumannii)** as a **critical pathogen**, responsible for 700 deaths and \$281 million in healthcare costs in 2017.
- The **pathogen CRAB** induced **pneumonia** and **sepsis**. **CRAB** infections often occur in critically ill, **immune compromised patients** or those with medical devices like

catheters.

- **Gram-negative bacteria** pose treatment challenges due to their **protective outer membrane**, including **lipopolysaccharide (LPS)**.
- **Roche and Harvard scientists** detailed how the antibiotic targets the **LPS transport machine** in **Acinetobacter**, aiding in **outer membrane disruption**.
- Pharmaceutical companies have limited focus on **antibiotic development**, with only a small percentage of molecules directed at **bacterial infections**.

Significance:

- The rising **antimicrobial resistance (AMR) crisis** claims **millions of lives annually** and threatens **health coverage** and **sustainable development goals**.
- **AMR's projected impact** is alarming, with estimates suggesting it **could surpass cancer-related deaths** in the next few decades.
- Urgent innovation in antibiotics is crucial to **combat AMR's growing threat** to global health and sustainability.

Topic 17. ADITYA L1, ISRO'S MISSION TO STUDY SUN, SET TO BE PLACED IN FINAL ORBIT TOMORROW

Important for the subject: Science and Technology

India's maiden solar mission Aditya-L1 is set to reach its intended destination L1 point on January 6, 2024

- Aditya L1 has successfully undergone **four earth-bound maneuvers** and a **Trans-Lagrangian Point 1** Insertion maneuvers.
- The Aditya L1 spacecraft is expected to reach the **Lagrangian point (L1)** on January 6, and will attempt a crucial maneuver to bind the spacecraft to an orbit around L1.
- **ISRO Scientists and Engineers from the Mission Operations Complex of ISTRAC** will perform this crucial maneuver which will bind Aditya-L1 to an orbit around L1.
- Upon reaching its final destination, the spacecraft will be able to view the sun without any eclipses.

About Aditya L1:

- Aditya L1 is **India's first mission** to study the Sun. **Aditya-L1 is also ISRO's second astronomy** observatory-class mission after AstroSat (2015).
- It was launched using the **Polar satellite Launch Vehicle**. The spacecraft will travel 1.5 million km from the Earth to the **Lagrange 1 or L1 point** between the Earth and the Sun.

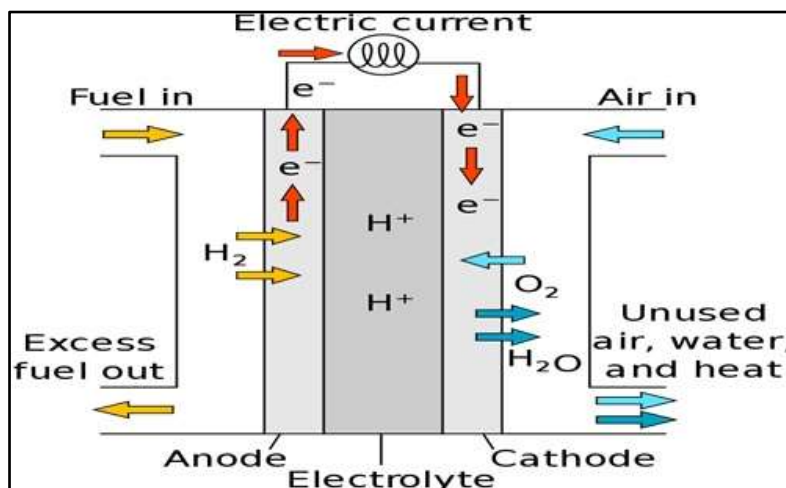
- The main objective of the mission is to get a **deeper understanding of the star closest to us**, and how its radiation, heat, flow of particles, and magnetic fields affects us.
- The main payload is the **Visible Emission Line Coronagraph (VLEC)** which was designed by the Indian Institute of Astrophysics and will help study the solar corona from the lowermost part upwards.
- **The Solar Ultraviolet Imaging Telescope (SUIT)** designed by the Inter University Centre for Astronomy and Astrophysics (IUCAA) will capture the UV image of the solar photosphere and chromosphere.
- **The Solar Low Energy X-ray Spectrometer (SoLEXS)** and **High Energy L1 Orbiting X-ray Spectrometer (HEL1OS)** are developed by the UR Rao Satellite Centre and will help in studying X-ray flares.
- **The Aditya Solar wind Particle EXperiment (ASPEX)** developed by ISRO's Physical Research Laboratory and **Plasma Analyser Package for Aditya (PAPA)** developed by Space Physics Laboratory of ISRO's Vikram Sarabhai Space Centre are designed to study the solar wind and energetic ions.
- Advanced **Tri-axial High-Resolution Digital Magnetometers (MAG)** will measure the interplanetary magnetic fields at the L1 point.
- The spacecraft also has a coronagraph that will allow scientists to look much closer to the surface of the Sun and complement the data from **NASA and European Space Agency's Solar and Heliospheric Observatory (SOHO) mission**.

Lagrange points:

- There are five Lagrange points i.e. L1 to L5, between any two orbiting celestial bodies.
- These points can act as parking spots in space where the gravitational pull of the celestial objects equals the centripetal force required to keep a satellite in orbit.
- This means satellites placed at Lagrange points do not need to expend a lot of fuel to remain in position.
- Lagrange point 1 or L1 is one of the five points which is located around 1.5 million kilometers away, where the gravitational forces of the Sun and the Earth are in equilibrium.
- Both the European Space Agency (ESA) and NASA- Solar and Heliospheric Observatory (SOHO) have placed their satellites at L1.

Topic 18. ISRO SUCCESSFULLY TESTS POLYMER ELECTROLYTE MEMBRANE FUEL CELL ON PSLV-C58'S ORBITAL PLATFORM POEM3

Important for the subject: Science and Technology



India's space agency, the **Indian Space Research Organisation (ISRO)** has celebrated a significant achievement of a successful flight test of a fuel cell intended for space use.

- The **Vikram Sarabhai Space Centre/ISRO** conducted this test of assessing a 100 W class **Polymer Electrolyte Membrane Fuel Cell based Power System (FCPS)** within its orbital platform POEM3.
- Throughout the test duration, an impressive **180 W of power** was generated from Hydrogen and Oxygen gasses stored in high-pressure vessels.

Objective of the Experiment:

- The objective is to assess **Polymer Electrolyte Membrane Fuel cell operation** in space and to collect data to facilitate the design of systems for future missions.

Hydrogen fuel cell:

- **Hydrogen fuel cells** function by directly **converting Hydrogen and Oxygen** gasses into electricity, water, and heat, employing **electrochemical principles**.
- The capacity to **generate electricity directly from fuels** without intermediate steps, these fuel cells boast exceptional efficiency.
- Their **emission-free nature, producing only water as a byproduct**, positions them as ideal candidates for human-involved space missions, meeting critical requirements like electric power, water, and heat through a single system.
- It is considered an **optimal solution to replace current vehicle engines** and power

standby systems.

- These cells boast equivalent range and fuel recharge times compared to conventional engines, offering a substantial advantage over batteries while promoting emission-free transportation.

Polymer Electrolyte Membrane Fuel Cell:

- **Proton-exchange membrane fuel cells (PEMFC)** are known as polymer electrolyte membrane (PEM) fuel cells.
- PEMFCs **generate electricity** and operate on the opposite principle to PEM electrolysis, which **consumes electricity**.
- They use a **proton-conducting polymer membrane** as the electrolyte. **Hydrogen** is typically used as the fuel. It is a type of fuel cell being developed mainly for transport applications, as well as for stationary fuel-cell applications and portable fuel-cell applications.

About POEM:

- The **PSLV Orbital Experimental Module (POEM)** is a platform that will help perform in-orbit experiments using the final, and otherwise discarded, stage of ISRO's **Polar Satellite Launch Vehicle (PSLV)**.
- The PSLV is a **four-stage rocket** where the **first three spent** stages fall back into the **ocean**, and the **final stage (PS4)** after launching the satellite into orbit ends up as **space junk**.
- **POEM has a dedicated Navigation Guidance and Control (NGC)** system for attitude stabilization, which stands for controlling the orientation of any aerospace vehicle within permitted limits. POEM will derive its power from solar panels mounted around the **PS4 tank, and a Li-Ion battery**.

Topic 19. CABINET GIVES NOD TO 'PRITHVI' PROGRAMME FOR EARTH OBSERVATION

Important for the subject: Science and Technology

The Union Cabinet cleared a **₹4,797-crore programme** called '**Prithvi**' (**Earth**) that is expected to subsume **five existing schemes** of the **Ministry of Earth Sciences (MoES)**.

- Cabinet approval for an agreement between the **Indian Space Research Organisation** and the **Mauritius Research and Innovation Council** to jointly develop a "small satellite."

PRITHVI Vigyan (PRITHVI) Program Objectives:

- Enhance **long-term observations of various Earth components** (atmosphere, ocean, geosphere, etc.) **to monitor planetary changes.**
- Develop models for weather prediction, understanding climate hazards, and studying climate change.
- Explore **polar and high-seas regions** to uncover new phenomena and resources. Create technology for **sustainable exploration and utilization of oceanic resources** for societal needs.
- Apply insights from **Earth system science to benefit society, the environment, and the economy.**

Deep Ocean Mission (DOM):

- Launched by **MoES**, focusing on various activities including **sending a manned submersible 6,000 meters into the Indian Ocean.**
- Part of the broader **Prithvi programme**, integrating major activities of the Ministry. Approved by the Cabinet in 2021 with an allocation of **₹4,000 crore for five years.**

Ministry's Activities:

- The **research and development and operational (services) activities** of the **Ministry** are carried out by its **10 institutes.**
- They are the India Meteorological Department, the National Centre for Medium-Range Weather Forecasting, the Centre for Marine Living Resources and Ecology, the National Centre for Coastal Research.
- The National Centre for Seismology, the National Institute of Ocean Technology, the Indian National Centre for Ocean Information Service, the National Centre for Polar and Ocean Research, the Indian Institute of Tropical Meteorology, and the National Centre for Earth Science Studies. Supported by a fleet of research vessels for required research.

Topic 20. 'DEEP TECH' POLICY TO BE SENT TO CABINET FOR APPROVAL, SAYS SCIENTIFIC ADVISER***Important for the subject: Science and Technology***

The Indian government is set to approve a new 'deep tech' policy after public comments on the draft released in July 2023, the final version of the policy is ready for Cabinet approval.

Basics of 'Deep Tech'

- 'Deep tech' refers to **startups that develop intellectual property based on new scientific breakthroughs**, aiming for significant impact. Ex. AI, ML, Blockchain,

Quantum Computing etc.

Facts:

- As per Startup India, there are **10,298 startups** in various sub-sectors of deep tech as of May 2023. India ranks **third globally** in the startup ecosystem, with over 3000 deep tech businesses. These firms are expanding into areas like agriculture, life sciences, chemistry, aerospace, and green energy.

Draft National Deep Tech Startup Policy (NDTSP) 2023

Policy Goals:

- The NDTSP aims to address challenges in funding, talent acquisition, and scaling R&D operations for deep tech startups.
- The policy is designed to promote innovation, economic growth, and societal development in the deep tech sector.

Key Pillars:

- The policy focuses on **securing India's economic future, progressing towards a knowledge-driven economy, bolstering national capability, and encouraging ethical innovation.**

Public Consultation:

- The draft policy was open for public feedback until September 15, after consultations with stakeholders in the deep tech ecosystem.

Funding and Innovation:

- The policy proposes **financial support through grants, loans, and venture capital**, along with regulatory simplifications and academia-industry collaboration.

Talent Development:

- Emphasis on **STEM education, training opportunities, and attracting international talent.**

Infrastructure and Technology Access:

- Establishment of deep tech incubation centers, testing facilities, and shared infrastructure resources.

Public Procurement and Market Opportunities:

- Encouraging government agencies to adopt deep tech solutions and facilitating international market access.

Intellectual Property Protection:

- Establishing a uniform IP framework and implementing cybersecurity measures.

Topic 21. ANTIMICROBIAL RESISTANCE: HEALTH ISSUE THAT WILL NEGATE ADVANCES IN MEDICINE

Important for the subject: Science and Technology

About Anti-microbial resistance

Antimicrobial resistance (AMR) threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi.

- AMR occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death. As a result, the medicines become ineffective and infections persist in the body, increasing the risk of spread to others.
- Antimicrobials – including antibiotics, antivirals, antifungals and antiparasitics – are medicines used to prevent and treat infections in humans, animals and plants. Microorganisms that develop antimicrobial resistance are sometimes referred to as “superbugs”.

Multicentric Point Prevalence Survey of Antibiotic Use

- The ‘First Multicentric Point Prevalence Survey of Antibiotic Use at 20 NAC-NET Sites India 2021-22’ conducted by the **National Centre for Disease Control under the Health Ministry** has thrown up startling statistics, but more importantly, examining the minutiae italicises key issues that have been flagged by experts for years now.
- **Over 70% of the patients in tertiary-care hospitals across 15 States and two Union Territories were prescribed antibiotics;** over 50% of antibiotics prescribed have the potential to cause AMR.
- But the most crucial reveal was that **55% of the patients surveyed were prescribed antibiotics as prophylaxis, or as a preventive; only 45% were prescribed antibiotics to actually treat infections; of this, only 6% were prescribed the drugs after identifying the specific bacteria.**

Occurrence of AMR and causes

- AMR occurs when pathogens evolve, fortifying themselves against drugs, and stop responding to antimicrobial drugs. While it is the nature of pathogens to evolve, this ever-increasing crisis is constantly being exacerbated by unsound medical, and animal husbandry practices.
- It is precisely the sort of misuse and overuse of antimicrobials, as revealed by the survey, which cause the development of drug-resistant pathogens that in turn pose great risk to life and exacerbate morbidity.
- The World Health Organization (WHO) estimates that bacterial AMR was directly

responsible for 1.27 million global deaths in 2019 and contributed to 4.95 million deaths.

What are the Steps taken by the Government to address AMR?

- **National Action Plan (NAP) for AMR:** In April 2017, India's NAP for AMR was released by the Union Ministry of Health and Family Welfare. The objectives of the NAP include increasing awareness, strengthening surveillance, promoting research, and improving infection prevention and control.
- **Signing the Delhi Declaration on AMR:** The Delhi Declaration on Antimicrobial Resistance (AMR) is an inter-ministerial consensus that was signed by the ministers of the concerned ministries in India.
- **Antibiotic Stewardship Program (AMSP):** The Indian Council of Medical Research (ICMR) has initiated the AMSP on a pilot project basis in 20 tertiary care hospitals across India. The program aims to control the misuse and overuse of antibiotics in hospital wards and ICUs.
- **Ban on inappropriate fixed dose combinations (FDCs):** On the recommendations of the ICMR, the Drug Controller General of India (DCGI) has banned 40 FDCs that were found to be inappropriate.
- **Ban on the use of Colistin as a growth promoter in animal feed:** The ICMR, in collaboration with the Indian Council of Agriculture Research, Department of Animal Husbandry, Dairy and Fisheries, and the DCGI, has banned the use of Colistin as a growth promoter in animal feed in poultry.
- **One Health approach:** The government is working on a One Health approach by encouraging interdisciplinary collaboration at the human-animal-environmental interface. The key priority areas include zoonotic diseases, food safety, and antibiotic resistance.
- **Integrated One Health Surveillance Network for AMR:** The ICMR has undertaken a project on an "Integrated One Health Surveillance Network for Antimicrobial Resistance" in collaboration with the Indian Council of Agriculture Research to assess the preparedness of Indian Veterinary laboratories to participate in an integrated AMR surveillance network.

Topic 22. CENTRE NOTIFIES REVISED RULES FOR QUALITY CONTROL OF PHARMA PRODUCTS

Important for the subject: Science and Technology

Recently, the **Health Ministry** notified **revised Pharma manufacturing rules** under schedule M to ensure quality control. The Central government, after consultation with the **Drugs Technical Advisory Board**, notified the revised rules under the **Drugs (Amendment) Rules, 2023**.

- The revised **Schedule M** prescribes the **Good Manufacturing Practices (GMP)** and

requirements of premises, plant, and equipment for pharmaceutical products as per global standards. The Ministry had set a six-month deadline for small manufacturers and **12 months for large units** to get their World Health Organization-Good Manufacturing Practices (WHO-GMP) certification.

Schedule M of the Drugs and Cosmetics Act, 1940:

- It includes **requirements of facilities and their maintenance, personnel, manufacture, control, safety testing, storage and transport of material, written procedures and records, and traceability** for pharmaceutical products.

Revised Schedule M of the Drugs and Cosmetics Act, 1940:

- The changes introduced in the **revised Schedule M** include **introduction of a pharmaceutical quality system (PQS), quality risk management (QRM), product quality review (PQR), qualification and validation of equipment, and a computerized storage system for all drug products.**
- Manufacturers must assume **responsibility for the quality** of the pharmaceutical products to ensure that they are **fit for their intended use**, comply with the requirements of the license, and do not place patients at risk due to inadequate safety, quality, or efficacy.
- Companies must **market a finished product** only after getting “**satisfactory results**” on tests of the ingredients. Companies must **retain a sufficient quantity of the samples of intermediate and final products** to allow repeated testing or verification of a batch.
- The focus will be on **risk management, qualification and validation of equipment, and self-inspection** will be vital contributions.
- The revised Schedule **M** has **13 parts** which provide GMP guidelines for the specific requirements for manufacturing pharmaceutical drugs.
- The revised rules has **five new categories of drugs** including pharmaceutical products containing hazardous substances such as **sex hormones, steroids (anabolic and androgenic), cytotoxic substances, biological products and radiopharmaceuticals.**

About Good Manufacturing Practices (GMP):

- GMP is mandatory standards which **build and bring quality** into a product by way of control on materials, methods, machines, processes, personnel, and facility/environment, etc.
- GMP was **first incorporated in Schedule M of the Drugs and Cosmetics Rules, 1945** in the year **1988**
- **Amendment** to this act was done in June, **2005** to replace the word, ‘**Good Manufacturing Practices**’ (GMP) with ‘**Good Manufacturing Practices and Requirements of Premises, Plant and Equipment for Pharmaceutical Products**’.

Implementation Plans:

- The revised rules are to be **implemented on the basis of company turnovers. Medium and small manufacturers (with an annual turnover of less than ₹250 crore)** who will have to implement the revised rules **within 12 months** from its date of publication.
- **Large manufacturers with an annual turnover of over ₹250 crore** will be given **six months** to do so.

Benefit of revised guidelines.

- The revised regulations of **Schedule M** will help ensure compliance with **international quality standards**.
- It will **benefit both patients and the industry** by promoting the **manufacturing of safe, effective, and high-quality drugs**.

About Drugs Technical Advisory Board:

- It is the **highest statutory decision making body** on technical matters pertaining to drugs in the country. The body was formed under **Drugs and Cosmetics Rules, 1940**.
- It is part of the **Central Drugs Standard Control Organization** which comes under the **Ministry of Health and Family Welfare**.
- Its function is to advise the **Central Government and the State Governments** on technical matters arising out of the administration of this Act

Topic 23. NSE'S INVESTOR BASE GROWS TO 8.5 CRORE IN 2023***Important for the subject: Economy***

The investor base of the **National Stock Exchange (NSE)** increased by 22 percent from 7 crore in 2022 to 8.54 crore in 2023.

- India's market capitalisation crossed \$4 trillion in December 2023. The benchmark Nifty index touched 21,000 on December 8, 2023. 99.85 percent of India's postal PIN codes are covered in terms of investor registrations.
- **NSE EMERGE:** Market capitalization of NSE EMERGE listed companies (SMEs) has crossed Rs 1, 00, 000 crore mark for the first time since 2012.

State wise registered investors:

- **Maharashtra** is at the top position with 1.49 crore investors.
- **Uttar Pradesh** is at the second position with 90 lakh investors
- **Gujarat** is at third position with 77 lakh investors followed by **West Bengal** with 48 lakh investors.

About National Stock Exchange (NSE):

- NSE is the **largest stock exchange in India** and is **one of the largest stock exchanges** of the world.
- NSE was **incorporated in 1992** and recognised as a stock exchange by SEBI in April 1993. However it commenced its operations in 1994

Headquarters: Mumbai

NSE is India's first digitized stock exchange.

- NIFTY 50 is a benchmark Indian stock market index, representing the weighted average of 50 largest Indian companies listed on the National Stock Exchange.

EMERGE Platform:

- **EMERGE** is a credible, efficient market place aimed at the **convergence of investors and emerging corporates** in the country.
- It offers **opportunities to informed investors** to invest in emerging businesses with exciting growth plans. It helps **SMEs and startups to connect with investors** for funding.

About Bombay Stock Exchange (BSE):

- **BSE is Asia's first & the Fastest Stock Exchange** in the world with the speed of 6 microseconds.
- It was established in **1875** as **'The Native Share & Stock Brokers' Association'**.
- On **31 August 1957**, BSE became the **first stock exchange** in India to get recognition from the Government of India under the Securities Contracts (Regulation) Act, 1956 (SCRA).
- Headquarters: **Dalal Street, Mumbai**. In 2017 BSE became the **1st listed stock exchange of India**.

Topic 24. LEMONGRASS, MINT SPREAD SCENT OF CHANGE IN ODISHA

Important for the subject: Economy

High-value aromatic crops and floriculture have recently emerged as a means to supplement the livelihood of **Odisha's tribal communities**.

- With the help of the **Central Institute of Medicinal and Aromatic Plants (CIMAP)** in **Lucknow**, the district of **Odisha** has recently introduced different aromatic plants such as **menthol mint** (the **CIM-Unnati** variety), **rosemary** (Hariyali variety), **patchouli** (CIM-Samarth), **damask roses** (Ranisahiba), **chamomile**, and **geraniums** (CIM-Bharat).

Higher value:

- Tribal farmers in **Nabarangpur, Odisha**, are **transitioning to high-value crops** like **lemongrass** and **aromatic plants**, encouraged by successful experiments with **strawberries** and **lemongrass**.
- **Lemongrass, mentha, vetiver, and citronella** are now cultivated across **300 acres**, with the installation of distillation units for processing **lemongrass oil**.

Huge demand:

- **Aromatic plants** are in **high demand** due to **fewer regulatory challenges** compared to **medicinal crops**, offering farmers promising returns with minimal effort.
- In **Odisha**, the **CSIR-Aroma Mission** has reached **26 districts**, establishing 46 clusters and planting nearly 850 hectares with aromatic crops.
- The successful introduction, notably **lemongrass** began on a small scale but quickly gained market traction, selling out its **distilled oil** instantly.

Lemon grass:

- **Cymbopogon**, also known as **lemongrass**, barbed wire grass, silky heads, oily heads, Cochin grass, Malabar grass, citronella grass or fever grass, is a genus of **Asian, African, Australian, and tropical island plants** in the **grass family**.
- Some species (particularly *Cymbopogon citratus*) are commonly cultivated as **culinary and medicinal herbs** because of their **scent**, resembling that of **lemons** (*Citrus limon*).
- **Lemongrass** and its **oil** are believed to possess **therapeutic properties**.

Repel elephants:

- **Aromatic plants** like **lemongrass, citronella, and vetiver** have served as **effective deterrents** against **wild elephants** in **Angul district**, causing them to vomit upon consumption.
- This success led to the expansion of **aromatic plantations** to over 150 acres in Angul and Dhenkanal districts within two years.
- **Cultivating aromatics on uncultivable lands** is **preferred to avoid interference with paddy fields** while providing **additional income to farmers**.

Beyond Oil and Gas Alliance (BOGA):

- It is an **international alliance** of governments and stakeholders working together to facilitate the managed **phase-out of oil and gas production**.
- **Led by** the governments of **Denmark and Costa Rica**, the alliance **aims** to elevate the issue of oil and gas production phase-out in international climate dialogues, mobilize action and commitments, and create an international community of practice on this issue.

Members:

- Denmark, Costa Rica, France, Greenland, Ireland, The Marshall Islands, Portugal, Quebec, Sweden, Tuvalu, Vanuatu, Wales, Washington state.
- **Associate members:** California and New Zealand.

BOGA Declaration:

- The **BOGA Declaration** is a shared commitment between national governments, subnational governments, and other actors to work to **limit oil and gas production and extraction** and plan for a **just, equitable, and managed phase out of existing oil and gas production**.
- By signing, actors indicate their support for BOGA's goals and theories of change. All actors who wish to become a member of BOGA at any level must sign, with additional steps required for those who wish to become Core or Associate members.

Topic 25. DIRECTIVES ISSUED BY RBI ON INOPERATIVE ACCOUNTS

Important for the subject: Economy

Annual Review of Dormant Accounts:

Central Bank instructed to **conduct an annual review of accounts with no customer-induced transactions for over a year**.

- **Term deposit accounts without explicit renewal mandates, where funds remain unwithdrawn after maturity**, are also Important for the subject to review.
- **Zero-balance accounts opened for the credit of scholarship amount or Direct Benefit Transfer under government schemes** are exempted.
- Cautionary communication stating that the account will be deemed 'inoperative' without transactions during the extended period.

Account Classification:

- The classification of inoperative accounts is **specific to each customer account, not across multiple accounts of the same customer**

Reactivation Procedures:

- Inoperative accounts may be reactivated, **Important for the subject to fresh KYC documentation and a second level of authorization**.
- Banks to enquire about the **whereabouts of unresponsive account holders or nominees/heirs**.

Fraud Prevention Measures:

- **Regular monitoring of reactivated inoperative accounts** for at least six months without

customer or staff knowledge.

- **Maintenance of system logs and concurrent audit for inoperative and reactivated accounts.**
- Consideration of **imposing a cooling-off period on reactivation, with restrictions on the number and amount of transactions.**

Disclosure Requirements:

- Banks obligated to display details of unclaimed deposits transferred to the **RBI-maintained Depositor Education and Awareness Fund (DEA) monthly.**
- Provision of information on the process for activating inoperative accounts and claiming balances.

Fund Transfer to DEA:

- Credit balance in deposit accounts inactive **for at least 10 years or unclaimed amounts for 10 years to be transferred to the DEA Fund.**

Unclaimed Deposits:

- Unclaimed deposits refer to the **funds held in bank accounts that remain untouched or unclaimed for a period of 10 years.**
- After the specified period, unclaimed deposits are transferred to the **Depositor Education & Awareness Fund (DEA)** maintained by the RBI.
- **The DEA Fund is utilized for promoting depositor education and awareness initiatives.**

Depositor Education and Awareness (DEA) Fund Scheme

- The **Depositor Education and Awareness Fund (DEA)** is a fund maintained by the Reserve Bank of India (RBI) with the objective of promoting depositor education and awareness.
- It serves as a mechanism to utilize unclaimed deposits that have been inactive for a specified period, 10 years, and unpaid matured deposits in the banking system for a productive purpose.

Objective of DEA Fund Scheme:

- Established by the Reserve Bank of India (RBI) in 2014. **Create awareness among depositors and protect their interests regarding unclaimed deposits.**

Source of Funds:

- Unclaimed deposits in savings, fixed, recurring, and other deposit accounts contribute to

the DEA. **Additionally, matured deposits that remain unclaimed are also transferred to this fund.**

Management:

- The RBI manages and maintains the DEA Fund.

Public Awareness:

- Activities funded by DEA aim to **raise public awareness about the importance of financial planning, safe banking practices, and understanding banking terms and conditions.**

Contributions to DEA Fund:

- Public sector banks: Transferred Rs 36,185 crores of unclaimed deposits until March 31, 2023.
 - Private banks: Transferred Rs 6,087 crores to the DEA Fund during the same period.
- Collective effort to address unclaimed deposits and prioritize consumer welfare.**

Centralized Web Facility:

- RBI's plan to establish a centralized web facility. Public can **use the web facility to locate unclaimed deposits** across various financial institutions.
- Aims to **enhance consumer accessibility, facilitate the resolution process, and ensure rightful claimants receive unclaimed funds.**

Other RBI Schemes:**RBI Retail Direct Scheme:**

- This scheme provides a **direct avenue for retail investors to invest in government securities issued by both the central and state governments.**

RBI Integrated Ombudsman Scheme:

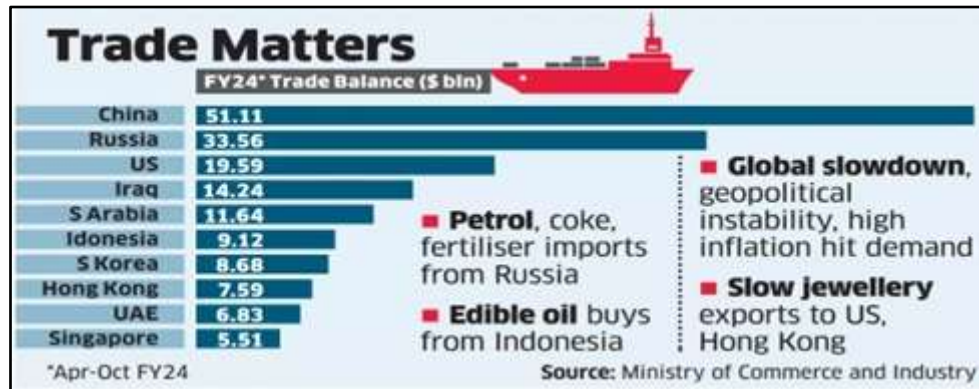
- Introduced to **enhance the grievance redress mechanism, this scheme facilitates the resolution of customer complaints against entities regulated by the RBI.**

Payments Vision 2025:

- This initiative outlines the RBI's vision for the year 2025 **with the objective of providing users with safe, secure, fast, convenient, accessible, and affordable e-payment options.**

Topic 26. INDIA RECORDS TRADE DEFICIT WITH NINE TOP TRADING PARTNERS IN APRIL-OCTOBER FY24: REPORT

Important for the subject: Economy



India's total merchandise exports decreased by 6.51% to \$278.8 billion in April-November period of FY24. India's imports fell by 8.67% to \$445.15 billion during the same period.

- During the first seven months of the fiscal year 2023-24, India experienced a trade deficit with nine of its top ten trade partners except the US.

Findings in the Report:

- The trade surplus with the **US (India's largest trading partner)** amounted to \$19.59 billion. Deficits with China, Russia, and the UAE reached \$51.11 billion, \$33.56 billion, and \$6.83 billion, respectively
- **Imports from Russia:** India imports petrol, high calorific value coal, coke and briquettes, and fertilizer, especially potash from Russia
- **Exports:** Declination in exports of gems and jewelry to Hong Kong and the US. Trade deficits were also recorded with Saudi Arabia, Indonesia, Iraq, Singapore, and South Korea.
- **India – Indonesia:** The trade deficit among the two countries is because of edible oil. It was getting normalized because of rice and sugar exports to them but now those are restricted and the deficit has increased
- India has **traditionally had a deficit with Korea** despite the two inking a Comprehensive Economic Partnership Agreement in 2009.

India -Iran Trade prospects:

- India's exports to Iran dipped 47% year-on-year to \$567 million in April-October 2023. The Israel-Hamas war has severely damaged revival prospects of these exports.
- The decrease is attributed to a minimal rupee balance in the rupee-rial account. India still imports certain agricultural products from Iran, such as saffron, which generates rupee

balance.

- **Non-functional rupee-rial mechanism:** Suspended oil imports accounted for non functional rupee rial mechanism.
- Iran has reduced its tea and rice imports from India because of foreign exchange issues and finalization of the rupee-payment mechanism.

About Federation of Indian Export Organisations:

- **Establishment:** Federation of Indian Export Organisations, popularly known as FIEO, was set up in **1965 as an Apex Body of Export Promotion Organisations in the country.**
- **Registration:** FIEO is registered under the **Societies Registration Act, 1860 with its Headquarters in Delhi**, Regional Offices in Delhi, Mumbai, Chennai and Kolkata
- **Purpose:** FIEO provides the crucial interface between the international trading community of India and the Central and State Governments, financial institutions, ports, railways, surface transport and all engaged in export trade facilitation.

About Free Trade Agreements:

- **A Free trade Agreement (FTA)** is an **agreement between two or more countries** or trading blocs that primarily agree to reduce or eliminate custom tariffs and non-tariff barriers on substantial trade between them.
- India has signed bilateral trade deals in the form of **Comprehensive Economic Partnership Agreement (CEPA)/ Comprehensive Economic Cooperation Agreement (CECA)/FTA/Preferential Trade Agreements (PTAs)** with some **18 groups/countries.**

Balance of trade:

- Balance of trade (BOT) refers to the **difference between the value of a country's exports and the value of a country's imports** for a given period. BOT is the **largest component** of a country's balance of payments (BOP).

Topic 27. CONCERNS RAISED BY RBI OVER CREDIT INFORMATION COMPANIES (CICS)

Important for the subject: Economy

Reserve Bank of India (RBI) expressed concerns over Credit Information Companies (CICs), urging them to address key areas for service improvement.

Rise in Customer Complaints:

- RBI flagged an **increase in customer complaints related to credit information.**

Six Key Areas of Focus:

- CICs were advised to concentrate on six crucial areas:
- **Data Quality Improvement:** Emphasis on enhancing the quality of data.
- **Timely Complaint Resolution:** Ensure timely redressal of customer complaints.
- **Internal Ombudsman Framework:** Strengthen the internal ombudsman framework
- **Streamlining Data Correction:** Simplify the process for handling data correction requests.
- **Cyber security and Data Privacy:** Strengthen cyber security and data privacy through a robust information security governance framework.
- **Data Usage Concerns:** Address concerns arising from the use of data for consulting and analytics.

Overview of Credit Information Companies (CICs)

Functions of CICs:

- CICs collect public data, credit transactions, and payment histories of individuals and companies related to loans and credit cards.
- They gather data from various sources, including banks, financial institutions, lenders, and credit-granting entities, and compile it into credit reports.

Creditworthiness Assessment:

- Banks and non-banking financial institutions refer to CIC reports and scores to assess the creditworthiness of borrowers before granting loans or issuing credit cards.

Regulatory Framework:

- CICs in India are regulated and supervised by the Reserve Bank of India (RBI) and governed by the Credit Information Companies Regulation Act, 2005 (CICRA).
- As per CICRA, every credit institution, like banks, must be a member of at least one CIC.

Functions of CICs:

- **Credit Reports:** CICs collect and maintain credit-related information from various sources, including banks, financial institutions, and credit card companies. They compile this information into credit reports for individuals and businesses.
- **Credit Scores:** CICs calculate credit scores based on the credit history and financial behavior of individuals. Credit scores provide a numerical representation of

creditworthiness.

- **Risk Assessment:** Lenders use credit reports and scores from CICs to assess the credit risk associated with potential borrowers. This information helps in making informed lending decisions.

Major CICs in India:

- **Credit Information Bureau (India) Limited (CIBIL):** One of the leading credit bureaus in India, CIBIL provides credit information reports and scores to individuals and businesses.
- **Equifax:** Equifax is a global credit information company operating in India. It offers credit reports and scores to assist in risk assessment.
- **Experian:** Experian is another major credit information company providing credit reports, scores, and analytics to support lending decisions.
- **CRIF High Mark:** CRIF High Mark is a credit bureau that offers a range of credit information services, including credit reports and analytics.

CIBIL Score:

- **It is a three-digit numeric summary of an individual's credit history. Derived using credit history found in the CIBIL Report, considering the borrower's credit profile over the last 36 months.**
- **Range:** The score ranges from 300 to 900, with higher scores indicating a better credit profile.
- **Lender Evaluation:** Lenders use the CIBIL report and score to assess the risk of lending and decide on loan/credit card applications.
- **Approval Chances:** The closer the CIBIL Score is to 900, the higher the chances of approval for credit card or loan applications.

Topic 28. YIELD SPREAD WIDENING BETWEEN SDLS AND G-SECS

Important for the subject: Economy

Yield Spread Widens to Two-Year High:

The spread between yields on 10-year state bonds and the benchmark 10-year government bond has widened.

- On Tuesday, the yield spread reached 53 basis points (bps), marking a two-year high. The last time it widened above 50 bps was in January 2022.

Growing Disparity in Borrowing Costs:

- The widening yield spread indicates an **increasing difference in borrowing costs** between states and the central government. **States may face higher costs when raising funds compared to the sovereign.**

States' Borrowing Plans:

- States and union territories are set to borrow Rs 4.1 trillion during January-March. **Karnataka, West Bengal, Madhya Pradesh, and Tamil Nadu account for half of this borrowing.**
- **Karnataka and West Bengal are expected to contribute significantly** to the incremental borrowing of Rs 1.1 trillion in the last quarter.

Year-on-Year Increase in State Borrowing:

- This borrowing surge represents a 37.4% year-on-year increase, following the substantial issuance of Rs 3 trillion in Q4 FY23.

Potential Yield Spread Outlook:

- Analysts suggest that the **yield spread might widen further, possibly reaching 60 bps during the quarter** if states borrow the indicative amount.
- The **average spread stood between 30 and 35 bps** in the first and second quarters, reflecting historical trends.

Yield Spread and its aspects:

- **Yield Spread** refers to the **difference between the yields of two different financial instruments or securities**. It is often used to analyze the relative risk or return between these instruments.
- The **yield spread is calculated by subtracting the yield of one security from the yield of another.**
- It provides insights into the additional compensation **investors require for taking on higher risk or choosing one investment over another.**
- A **widening yield spread may indicate increased risk perception or economic uncertainty** wherein narrowing spread may suggest **improving economic conditions or reduced risk.**
- Investors and analysts use yield spreads **for investment decisions, risk assessment, and gauging market sentiment**. Historical spread trends **provide context for evaluating current market conditions.**

Topic 29. OBSERVATION OF INTERNATIONAL MONETARY FUND (IMF) ON INDIA'S DEBT:

Important for the subject: Economy

Debt Sustainability Concerns:

IMF expressed worries about the **long-term sustainability of India's debts**. Projected India's government debt to reach **100% of GDP by fiscal 2028** under adverse circumstances.

- Emphasized the need for **concessional financing, private sector investment, and carbon pricing** to address climate change challenges.

Exchange Rate Reclassification:

- IMF reclassified India's exchange rate regime as a **"stabilized arrangement"** instead of "floating." Possible indication of IMF's view on **"excessive management"** of the exchange rate.

Government's Response:

- Finance Ministry refuted IMF projections as a **"worst-case scenario"** and not a fait accompli.

Global Context of Rising Debt:

- Highlighted the **persistent debt conundrum** faced by developing nations globally.
- Countries face the dilemma of choosing between **servicing debt and meeting people's needs**.

Challenges for India:

- Challenges in managing **public debt** and enhancing **credit ratings**.
- Despite being the **fastest-growing major economy**, India's sovereign investment ratings have remained unchanged (Fitch Ratings and S&P Global Ratings: 'BBB' with a stable outlook).

Fiscal Concerns:

- Union government's debt and state governments' debt remain significant, with the **public debt-to-GDP ratio** above levels specified by the Fiscal Responsibility and Budget Management Act (FRBMA).
- Concerns about **fiscal slippage in FY24**, driven by higher expenditures on employment guarantee schemes and subsidies.

Election Year Challenge:

- In an election year, the challenge for India is to stick to the **fiscal correction path** to

avoid worst-case scenarios while addressing short-term challenges.

Importance of Prudent Fiscal Management:

- Observations underscore the importance of **prudent fiscal management** and **sustainable financing strategies** to navigate challenges effectively.

Public Debt Overview:

- Public debt refers to the **total amount borrowed by a country's government**

Comparison between Private and Public Debt:

Private Debt vs. Public Debt:

- **Private debt** pertains to obligations of private entities, while **public debt** involves government obligations.
- Private debt is incurred by **businesses, households, or individuals**, whereas **public debt** is incurred by the government.

Burden of Public Debt

Debt Burden Concerns:

- Public debt can become burdensome **due to high-interest payments and impact on government finances**.
- The burden depends on factors like **interest rates, economic conditions, and fiscal policies**

Source and Impact of Debt Burden:

- Debt obligations include those of the Central Government and State Governments.
- Central government debt includes borrowings at the national level, while state government debt pertains to sub-national borrowings.
- **Sources of public debt include borrowing from domestic and external sources, issuing bonds, etc.**
- High public debt may impose a burden on future generations if not managed prudently.

Impact of Internal Public Debt:

On Consumption and Investment:

- Internal public debt can influence consumption and investment patterns in the economy.
- Government borrowings may divert funds from private investment.

On Production and Distribution:

- **Impact on production and distribution, as government spending affects various sectors.**
- Distributional effects may be observed based on the allocation of resources.

On Private Sector:

- Influence on the private sector's borrowing costs and access to credit.
- **High internal public debt may lead to higher interest rates for businesses.**

On Resource Allocation and National Income:

- Allocation of resources may be affected as government debt competes for resources.
- Impacts national income through government spending and taxation policies.

On Liquidity and Money Market:

- Internal debt affects liquidity and the money market.
- **Government securities and bonds influence market liquidity and interest rates.**

Impact of External Public Debt**External Debt Dynamics:**

- External public debt involves obligations to foreign creditors.
- **Exchange rate fluctuations and global economic conditions impact the burden of external debt**

Debt-to-GDP Ratio:

- The debt-to-GDP ratio assesses a country's ability to repay its debt, with higher ratios often causing economic concerns.
- The NK Singh Committee on FRBM envisioned a debt-to-GDP ratio of 40% for the central government and 20% for states, aiming for a total general government debt-to-GDP ratio of 60%.

Recommendations from N.K. Singh Committee on FRBM Act:**Debt-to-GDP Ratio:**

- Central government: 40%
- State governments (combined): 20%

- Fiscal deficit target of 2.5% of GDP by 2022-23.

Flexibility in Deficit Targets:

- Allow flexibility in deficit targets based on economic conditions—**downwards in times of good growth and upwards during economic challenges.**

New Debt and Fiscal Responsibility Act:

- Enact a new Debt and Fiscal Responsibility Act, replacing the existing FRBM Act.
- **Establishment of a fiscal council to oversee the new framework.****Fiscal Council Composition:**

- Three-member fiscal council to prepare multi-year fiscal forecasts for both central and state governments.

- **Provide independent assessment of the central government's fiscal performance and compliance with new law targets.****Revenue Deficit-to-GDP Ratio:**

- Steady decline by 0.25 percentage points annually, reaching 0.8% in 2022-23.**Deviation for Unforeseen Events:**

- **Specify deviation in fiscal deficit target (not exceeding 0.5 percentage points) for unforeseen events** like war, national calamities, structural reforms, or sharp decline in real output growth.

Crowding-In and Crowding-Out of Investment:

Crowding-In:

- It occurs **when increased government spending stimulates private sector investment.**
- **Mechanism:** Government expenditure boosts demand, **leading to increased production and profitability for businesses. This, in turn, encourages private sector investment.**
- **Result:** Positive synergy between public and private investment, contributing to overall economic growth

Crowding-Out:

- It happens **when increased government spending reduces private sector investment.**
- **Mechanism:** Higher government borrowing raises interest rates, **making it more expensive for the private sector to borrow.**
- **This can lead to decreased private investment as businesses face higher costs.**
- **Result:** Competition for financial resources, **potentially limiting private sector expansion and economic activity**

Debt Trap:

- A situation where a country is trapped in a cycle of borrowing to meet its debt obligations, leading to a continuous increase in debt levels.

Mechanism:

- Excessive borrowing may be driven by the need to service existing debt or fund ongoing budget deficits.
- **High-interest payments can consume a significant portion of government revenue, making it challenging to invest in essential public services or reduce debt.**
- **Result:** Countries in a debt trap may find it difficult to escape the cycle, as new borrowing is used primarily to service existing debt rather than for productive investments.

Topic 30. KEY POINTS REGARDING DIVIDENDS AND DISINVESTMENT IN CPSES***Important for the subject: Economy*****Dividends in CPSEs:**

Dividends from Central Public Sector Enterprises (CPSEs) are expected to surpass ₹50,000 crore for the third consecutive fiscal year.

- The collections from dividends have already exceeded the Budget Estimate for the current fiscal. Dividend and disinvestment proceeds contribute to non-tax revenue and are managed by the Department of Investment and Public Asset Management (DIPAM).

Disinvestment Scenario:

- The strategic disinvestment of entities like IDBI Bank, Shipping Corporation, BEML, PDIL, HLL Life Care Ltd, and NMDC Steel Ltd is still pending.

Guidelines for Dividends:

- CPSEs follow guidelines set by the Finance Ministry, **requiring the payment of an annual dividend of 30% of Profit After Tax (PAT) or 30% of the government's equity, whichever is higher.**
- The guidelines also consider factors like cash and free reserves, with CPSEs having the option to issue bonus shares or pay special dividends based on their financial position.

Consistent Dividend Policy:

- In 2020, an advisory recommended a consistent dividend policy for CPSEs.

- CPSEs paying higher dividends (100% dividend or ₹10 per share) were encouraged to consider quarterly dividend payments, while others could follow a half-yearly frequency.
- The advisory suggested that CPSEs should aim to pay at least 90% of the projected annual dividend in one or more interim dividend instalment

Evolution of Divestment in India:

Initiation (1991):

- Divestment in India emerged as a **by-product of economic reforms initiated in 1991**.
- The objective was to **redefine the role of the government** versus the market.

Formalization (1996):

- The **Divestment Commission** was established in 1996 to examine and recommend withdrawal from non-strategic sectors.

Department of Divestment (1999):

- The Department of Divestment was formed in December 1999.
- Later, in September 2001, it became the **Ministry of Disinvestment**.
- Shifted to the Ministry of Finance in May 2004.
- Renamed as the **Department of Investment and Public Asset Management (DIPAM)**.

Objectives of Divestment:

- Redefine the government's role versus the market.
- Inject market discipline in PSUs' decision-making.
- Revive loss-making public enterprises.
- Generate additional resources for fiscal deficit and capital expenditure

Maharatna and Navratna Categories for CPSEs:

Maharatna Category

Criteria for Qualification:

- Must have Navratna status.
- Listed on the Indian stock exchange with prescribed public shareholding.
- **Average annual turnover > Rs. 25,000 crores (last 3 years).**
- **Average annual net worth > Rs. 15,000 crores (last 3 years).**

- **Average annual net profit after tax > Rs. 5,000 crores (last 3 years).**
- Significant global presence/international operations

Navratna Category:

Criteria for Qualification:

- Must have Navratna status.
- Miniratna Category – I or Schedule ‘A’ CPSEs.
- **‘Excellent’ or ‘Very Good’ rating in 3 of the last 5 years.**
- **Average annual turnover > Rs. 25,000 crores (last 3 years).**
- **Average annual net worth > Rs. 15,000 crores (last 3 years).**
- Composite score of 60 or above in 6 performance indicators including Net Profit to Net Worth, Cost of Services, Earnings per Share, etc

Miniratna Category-I:

Criteria for Qualification:

- Made profit in the last 3 years continuously.
- Pre-tax profit is Rs. 30 crores or more in at least 1 of the last 3 years.

Positive net worth status.

- Listed on the Indian stock exchange with prescribed public shareholding.

Miniratna Category-II:

Criteria for Qualification:

- Made profit for the last 3 years continuously.
- Positive net worth status.
- **Not defaulted in the repayment of loans/interest payment on any loans due to the Government.**
- **Not dependent upon budgetary support or Government guarantees.**

Tax and Non-Tax Receipts

Tax Receipts:

- **Tax receipts refer to the revenue collected by the government through various taxes imposed on individuals, businesses, and other entities.**
- Taxes are a primary source of government revenue and are utilized to fund public services, infrastructure development, social welfare programs, and other government

expenditures. There are two main categories of taxes:

Direct Taxes:

- These are **taxes levied directly on individuals and entities** based on their income or profits.
- Examples include income tax, corporate tax, and wealth tax.

Indirect Taxes:

- These are **taxes imposed on the production and consumption of goods and services.**
- Examples include goods and services tax (GST), excise duty, and customs duty.

Non-Tax Receipts:

- **Non-tax receipts encompass various sources of revenue for the government that are not derived from taxes.**
- These receipts contribute to the government's income and financial resources. Key components of non-tax receipts include

Dividends and Profits:

- Revenue earned by the government from its investments in public sector enterprises, often in the form of dividends.

Interest Receipts:

- Interest earned on loans extended by the government, including loans to other countries.

Fee and User Charges:

- Revenue generated from fees and charges for specific government services, licenses, permits, or the use of government-owned assets.

Disinvestment Proceeds:

- Funds generated from the sale of government-owned assets, such as shares in public sector enterprises, strategic disinvestment, and privatization.

Grants and Aid:

- Financial assistance received from other governments, international organizations, or entities for specific projects, programs, or developmental purposes.

Recoveries:

- Amounts recovered by the government, including loan repayments and recoveries from individuals or entities.

DIPAM (Department of Investment and Public Asset Management):

- **DIPAM is a government department under the Ministry of Finance in India. It plays a crucial role in the management of the government's investments and assets.**
- **DIPAM is involved in the strategic disinvestment of public sector enterprises and the monetization of non-core assets.**

Its key functions include:

Strategic Disinvestment:

- Planning and executing the strategic sale of government equity in public sector enterprises.

Monetization of Non-Core Assets:

- Identifying and monetizing non-core assets owned by the government.

Financial Management:

- Managing the government's financial investments, including disinvestment proceeds.

Asset Management:

- Efficient management of government assets to enhance returns.

Policy Formulation:

- Formulating policies related to disinvestment and asset management.

Interim Budget vs. Vote on Account – Key Differences

Nature and Timing:

- **Interim Budget:** Presented during an election year, **covering expenses and revenues until a new government is formed after the general elections.**
- **Vote on Account:** Passed as a convention **through the Interim Budget to approve essential government expenditures, such as salaries and ongoing expenses, before the elections. Valid for up to two months, extendable if necessary.**

Content:

- **Interim Budget:** Includes **estimates of expenditure, revenue, fiscal deficit, financial performance, and projections** for the upcoming financial year. **Cannot include major policy announcements or schemes, following Election Commission guidelines.**
- **Vote on Account:** Lists only the expenditure borne by the government, focusing on

essential costs.

Discussion and Approval:

- **Interim Budget:** Requires discussion in the Lok Sabha and formal approval.
- **Vote on Account:** Passed by the Lok Sabha without discussion, as it deals specifically with expenditure.

Tax Regime Impact:

- **Interim Budget:** Can propose changes in the tax regime, allowing adjustments to taxes.
- **Vote on Account:** Cannot change taxes under any circumstances.

Validity Period:

- **Interim Budget:** Similar to a full budget but covers projections for a few months.
- **Vote on Account:** Usually valid for two months but can be extended if necessary.

Topic 31. SUPREME COURT DIRECTS PROBE INTO HINDENBURG RESEARCH

Important for the subject: Economy

Investigation Order:

The Supreme Court has **directed the Securities and Exchange Board of India (SEBI) and investigating agencies to probe the conduct of Hindenburg Research.**

The investigation aims to **determine if the losses suffered by Indian investors due to Hindenburg's short position in Adani group entities involved any legal violations.**

Background:

- Hindenburg's report alleged that the **Adani group manipulated share prices and violated regulations by not disclosing transactions with related parties.**

Court's Observation:

- The court noted that the **volatility in Adani stocks had an impact at an individual level but did not pose a systemic market-level risk.**
- It emphasized that the SEBI investigation into the Adani group was comprehensive and inspired confidence.

SEBI's Investigation:

- SEBI had completed **22 out of 24 investigations into the Adani group following the Hindenburg report.**
- The remaining two were pending due to awaited inputs from foreign regulators. **The**

court ordered SEBI to expedite the pending investigations, preferably within three months.

- The court dismissed contentions that SEBI's amendments in Foreign Portfolio Investors (FPI) Regulations and Listing Obligations and Disclosure Requirements (LODR) Regulations hindered the investigation.
- It noted that such claims lacked merit and did not challenge the validity of the regulations. It emphasized that such reports could serve as inputs but should not be regarded as conclusive proof of the inadequacy of SEBI's investigation.

Conclusion:

- The Supreme Court's judgment underscores the need for a thorough investigation into the allegations made by Hindenburg Research and emphasizes the role of regulatory authorities in ensuring market integrity.
- **Hindenburg Research's Accusations Against Adani Group: A Comprehensive Overview**

Hindenburg Research:

- Hindenburg Research is a US-based investment research firm.
- **Specialization:** It specializes in forensic financial research, aiming to uncover corruption, fraud, and irregularities in the business world.
- Firm founded in 2017.

Short Selling:

- Short selling is the sale of a security or share that the seller does not own.
- **Process:** In short selling, an investor sells borrowed shares with the expectation of buying them back at a lower price later.
- **Opposite of Traditional Investment:** Unlike traditional investments where an investor buys shares with the hope that their value will rise, short selling profits from a decline in the stock's value.
- **Borrowing Shares:** Investors do not need to own the shares they sell short; instead, they borrow shares from brokers or dealers.

Hindenburg's Allegations Against Adani Group:

- **Nature of Allegations:** Hindenburg Research accused the Adani Group of engaging in

stock manipulation and accounting fraud.

- **Controlled Entities:** Hindenburg claimed that the **Adani family controlled offshore shell entities in tax havens, from the Caribbean and Mauritius to the United Arab Emirates.**
- **Accusations:** The alleged activities **involve corruption, money laundering, taxpayer theft, and siphoning off money from the group's listed companies.**

Investigation by SEBI on the directions of Supreme Court: –

- SEBI's investigation into the Adani-Hindenburg matter, directed by the Supreme Court in March 2023.
- **Similar allegations by the Organized Crime and Corruption Reporting Project (OCCRP) against the Adani Group.**

SEBI's Investigation:

- Supreme Court-directed investigation into **Rule 19A violations, non-disclosure of related party transactions, and stock price manipulation.**
- OCCRP alleges **Mauritius-based funds linked to the Adani family invested in Adani companies' stocks.**

OCCRP's Allegations:

- **OCCRP report alleges stock manipulation by the Adani Group.** Exclusive documents indicate Adani family-connected investors influencing stock prices.

About OCCRP:

- Global network of investigative reporters founded in 2006.
- Focus on **investigating organized crime and systemic corruption.**
- **Over 150 journalists in 30 countries,** collaborating with global partners.

Rule 19(A) of the Securities Contracts (Regulation) Rules, 1957:

- Rule 19(A) is a **provision under the Securities Contracts (Regulation) Rules, 1957,** which falls under the regulatory framework of the Securities and Exchange Board of India (SEBI).
- The rule is designed to **prevent concentrated ownership and promote liquidity** in the securities market.
- **Mandates listed companies to maintain a minimum of 25% public shareholding. Ensures sufficient shares for trading and promotes price discovery.**

Rule 19A Violations:

- Five listed Adani companies violated Rule 19A, **suspected FPIs were front companies for Adani promoters.**
- SEBI unable to establish prima facie contraventions due to regulatory loopholes.

Regulatory Amendments:

- **Amendments to FPI and LODR regulations in 2018 and 2019 opened loopholes,** allowing concealment of ultimate beneficiaries.
- **Subsequent amendments in November 2021 sought to plug regulatory gaps but had deferred prospective effects.**

FPI Rules and Disclosure:

- Changes in FPI rules in 2018 **eliminated the requirement for disclosing “ultimate natural person.”**
- SEBI’s challenges in **obtaining evidence due to repealed provisions** and compliance by FPIs.

IPO (Initial Public Offering):

- An Initial Public Offering (IPO) is the **process through which a private company offers its shares to the public for the first time, allowing it to raise capital from external investors.**

Process:

- The company **hires investment banks to underwrite the offering.** Approval is obtained from SEBI.
- Shares are offered to the public through various channels like stock exchanges. **Investors can buy shares, and the company becomes publicly traded.**

FPO (Follow-on Public Offering):

- A Follow-on Public Offering (FPO) occurs **when a company that is already publicly traded issues new shares to the public.**

Process:

- Similar to an IPO but involves a company that is already listed on a stock exchange.
- **New shares are offered to existing and new investors.**
- **The company works with investment banks to facilitate the offering.**

Free Float:

- Free float refers to the **portion of a company's shares that are held by public investors and are available for trading on the open market.**

Calculation:

- It includes **shares held by individual and institutional investors** but **excludes** shares held by insiders, promoters, and strategic investors.
- Usually expressed as a **percentage of the total outstanding shares.**

Importance:

- **A higher free float increases liquidity, making it easier to buy or sell shares in the market. Stocks with a smaller free float may experience higher price volatility.**
- Larger free float can contribute to a more stable stock price.

Securities and Exchange Board of India (SEBI)**Introduction:**

- SEBI is the regulatory authority for the Indian securities market, **established on April 12, 1992, by the SEBI Act 1992.**
- Its primary goal is to **promote transparency and safeguard investors' interests** in the Indian capital market.

History:

- Before SEBI, the **securities market was regulated by various government institutions**, leading to inconsistency.
- To **conduct search and seizure operations and impose stricter punishments for market manipulation and insider trading.**

Objectives:

- Regulating the functioning of the Indian capital market.
- Safeguarding investors' interests.
- Creating a safe investment environment through rules and regulations.
- Preventing malpractices in the Indian stock market.

Functions and Powers:

Functions:

- Protecting investors' interests.
- Promoting the development of the securities market.
- Regulating business operations in the securities market.
- Serving as a platform for various market participants.
- Educating investors about securities markets.
- Prohibiting fraudulent and unfair trade practices.
- Monitoring company takeovers and share acquisitions.
- Ensuring the efficiency and up-to-date nature of the securities market.

Powers:

- Passing judgments in cases of fraud and unethical practices.
- Examining financial records and gathering evidence against violations.
- Formulating rules and regulations to protect investors' interests.
- Eliminating malpractices in the securities market.

Topic 32. CONCERNS RAISED BY RBI OVER CREDIT INFORMATION COMPANIES (CICS)***Important for the subject: Economy***

Reserve Bank of India (RBI) expressed concerns over Credit Information Companies (CICs), urging them to address key areas for service improvement.

Rise in Customer Complaints:

- RBI flagged an **increase in customer complaints related to credit information.**

Six Key Areas of Focus:**CICs were advised to concentrate on six crucial areas:**

- **Data Quality Improvement:** Emphasis on enhancing the quality of data.
- **Timely Complaint Resolution:** Ensure timely redressal of customer complaints.
- **Internal Ombudsman Framework:** Strengthen the internal ombudsman framework.
- **Streamlining Data Correction:** Simplify the process for handling data correction requests.
- **Cyber security and Data Privacy:** Strengthen cyber security and data privacy through a

robust information security governance framework.

- **Data Usage Concerns:** Address concerns arising from the use of data for consulting and analytics.

Overview of Credit Information Companies (CICs)

Functions of CICs:

- CICs collect **public data, credit transactions, and payment histories of individuals and companies related to loans and credit cards.**
- They gather **data from various sources, including banks, financial institutions, lenders, and credit-granting entities**, and compile it into credit reports.

Creditworthiness Assessment:

- Banks and non-banking **financial institutions refer to CIC reports and scores to assess the creditworthiness of borrowers before granting loans or issuing credit cards.**

Regulatory Framework:

- CICs in India are regulated and supervised by the Reserve Bank of India (RBI) and **governed by the Credit Information Companies Regulation Act, 2005 (CICRA).**
- As per CICRA, every credit institution, like **banks, must be a member of at least one CIC.**

Functions of CICs:

- **Credit Reports:** CICs collect and maintain credit-related information from various sources, including banks, financial institutions, and credit card companies. They compile this information into credit reports for individuals and businesses.
- **Credit Scores:** CICs calculate credit scores based on the credit history and financial behavior of individuals. Credit scores provide a numerical representation of creditworthiness.
- **Risk Assessment:** Lenders use credit reports and scores from CICs to assess the credit risk associated with potential borrowers. This information helps in making informed lending decisions.

Major CICs in India:

- **Credit Information Bureau (India) Limited (CIBIL):** One of the leading credit bureaus in India, CIBIL provides credit information reports and scores to individuals and businesses.
- **Equifax:** Equifax is a global credit information company operating in India. It offers credit reports and scores to assist in risk assessment.
- **Experian:** Experian is another major credit information company providing credit

reports, scores, and analytics to support lending decisions.

- **CRIF High Mark:** CRIF High Mark is a credit bureau that offers a range of credit information services, including credit reports and analytics.

CIBIL Score:

- **It is a three-digit numeric summary of an individual's credit history. Derived using credit history found in the CIBIL Report, considering the borrower's credit profile over the last 36 months.**
- **Range:** The score ranges from 300 to 900, with higher scores indicating a better credit profile.
- **Lender Evaluation:** Lenders use the CIBIL report and score to assess the risk of lending and decide on loan/credit card applications.
- **Approval Chances:** The closer the CIBIL Score is to 900, the higher the chances of approval for credit card or loan applications.

Topic 33. KEY POINTS FROM THE AGRICULTURE AND COMMODITY SUMMIT 2024

Important for the subject: Economy

Call for Increased Private Investments:

Urged a **Fivefold increase in private investments** in agriculture by 2030, targeting of 10%, current is 2%. Emphasis on **diversifying farmer income beyond traditional crops**.

Focus on Industrial Needs:

- Farmers encouraged to **explore opportunities in meeting industrial needs such as ethanol production** through crops like maize.
- Maize identified as a future crop to meet ethanol industry demand and address climate change concerns.
- **Advocated for the democratization of credit and insurance in farming.**

Impact of Formal Credit on Agri Contribution:

- **10% increase in formal credit could lead to a 1% increase in agricultural contribution to overall GDP.**

Investment in Productivity-Enhancing Practices:

- Stressed the importance of investing in **productivity-enhancing agriculture practices using fertilizer, high-yielding seeds, and irrigation.**

- Emphasis on sustainable practices to **ensure long-term food security**.

Challenges Posed by Climate Change:

- **Lack of funds and the impact of climate change**

Role of Women in Agriculture:

- **Calls for providing women farmers with access to technology** and recognizing them as entrepreneurs.

Easing Access to Finance:

- The **fintech agriculture ecosystem** expected to add \$100 billion to India's GDP in the next five years.
- Experts urged the **government to be realistic in distributing free food grains through the public distribution system**.

Livestock Sector Potential:

- Industry experts highlighted the **potential of the dairy, poultry, and fisheries sectors to provide nutritional security to the malnourished at an affordable cost**.

State of Agriculture in India: –

Pre-1991 (Before Liberalization):

Government Intervention:

- The agricultural sector in India was characterized by significant government intervention. **Policies such as land reforms, minimum support prices (MSP), and public distribution systems were prevalent.**

Green Revolution:

- The **1960s and 1970s saw the Green Revolution, introducing high-yielding varieties** of seeds, fertilizers, and irrigation.
- **Increased production of wheat and rice**, leading to food self-sufficiency.

Focus on Food Grains:

- The emphasis was primarily on the **production of staple food grains like rice and wheat**.

Post-1991 (Liberalization Era):

Economic Reforms:

- The liberalization policies of 1991 aimed at **reducing government control and**

promoting market-oriented reforms.

Private Investments:

- There was a shift towards **encouraging private investments in agriculture.**
- Increased participation of private entities in the agribusiness sector.

Technology Adoption:

- **Adoption of modern farming practices, including the use of genetically modified (GM) crops.**
- **Mechanization and technology-driven agriculture** became more prevalent.

Diversification of Crops:

- Farmers started diversifying into **high-value cash crops, horticulture, and floriculture.**
- **Increased focus on organic farming and sustainable practices.**

FDI in Agriculture:

- Foreign Direct Investment (FDI) policies were relaxed to attract foreign capital.
- **Joint ventures and collaborations with international agricultural firms increased.**

Infrastructure Development:

- Investments in rural infrastructure, including **irrigation, storage facilities, and transportation networks.**
- **Introduction of e-marketing platforms and digital technologies.**

Government Initiatives:

- Implementation of schemes like the **National Mission on Sustainable Agriculture (NMSA) and Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).**
- Efforts to provide better market access to farmers.

Challenges Persist:

- Challenges such as **small landholding sizes, lack of access to credit, and vulnerability to climate change persisted.**
- Issues related to **minimum support prices (MSP) and market fluctuations**

Post-2020 and COVID-19 Impact:

- The agriculture sector gained importance during and after the COVID-19 pandemic. **Increased focus on self-sufficiency and local production.**
- **Brief overview of key schemes under the Ministry of Agriculture in India:**

Pradhan Mantri KISAN Samman Nidhi (PM-KISAN):

- Aim: Income support of Rs. 6,000 per year to small and marginal farmers.
- Direct cash transfer to the bank accounts of eligible farmers.

Pradhan Mantri Fasal Bima Yojana:

- Crop insurance scheme to provide financial support to farmers in case of crop failure.
- Covers all food crops, oilseeds, and horticultural crops.

Pradhan Mantri Krishi Sinchai Yojana:

- Focus on improving water use efficiency through efficient irrigation practices.
- Aims to achieve “Per Drop More Crop.”

Ayushman Sahakar Scheme:

- Promotes healthcare services through cooperatives.
- Aims to enhance the role of cooperatives in creating healthcare infrastructure.

E-NAM (National Agriculture Market):

- An online trading platform for agricultural commodities.
- Facilitates transparent and efficient online trading.

Pradhan Mantri Kisan Maan-Dhan Yojana (PM-KMY):

- Pension scheme for small and marginal farmers.
- Provides a fixed monthly pension after the age of 60.

Krishi Kalyan Abhiyan:

- Outreach program to promote best agricultural practices.
- Focus on improving farmers’ income and welfare.

Soil Health Cards (SHC) Scheme:

- Provides information about soil nutrient status to farmers.
- Aims to promote balanced and judicious use of fertilizers.

National Bamboo Mission:

- Promotes the holistic development of the bamboo sector.
- Focus on increasing the area under bamboo cultivation and value addition.

Green Revolution – Krishonnati Yojana:

- Integrates various agricultural schemes to promote sustainable farming.
- Aims to double farmers' income by 2022.

Yuva Sahakar-Cooperative Enterprise Support and Innovation Scheme:

- Encourages youth to take up cooperative ventures in agriculture.
- Provides financial support and training.

Pradhan Mantri Annadata Aay Sanrakshana Abhiyan (PM-AASHA):

- Aims to ensure remunerative prices to farmers for their produce.
- Involves Price Support Schemes, Price Deficiency Payment Scheme, and Pilot of Private Procurement and Stockist Scheme.

Paramparagat Krishi Vikas Yojana:

- Promotes organic farming and certification.
- Aims to improve soil health and conserve natural resources.

National Food Security Mission:

- Enhances food production and productivity.
- Focus on increasing the production of rice, wheat, pulses, and coarse cereals.

Pandit Deen Dayal Upadhyay Unnat Krishi Shiksha Yojana (PDDUUKSY):

- Promotes higher education in agriculture and allied sciences.

Rashtriya Gokul Mission:

- Aims to conserve and develop indigenous cattle breeds.
- Focus on enhancing milk productivity and promoting sustainable breeding.

CACP – Commission for Agricultural Costs and Prices:

- The Commission for Agricultural Costs and Prices (CACP) is **an attached office under the Ministry of Agriculture and Farmers Welfare.**
- **Established in 1965, its primary role is to recommend Minimum Support Prices (MSPs) for major agricultural crops to ensure a fair return to farmers for their produce.**

Key Functions of CACP:**MSP Recommendations:**

- CACP recommends MSPs for various crops based on factors **such as the cost of production, market prices, and agricultural input prices**. MSP is the minimum price at which the government procures crops from farmers.

Cost of Cultivation Studies:

- The commission conducts **studies on the cost of cultivation of various crops, taking into account factors like input costs, labor, land, and other related expenses**.

Price Policy Formulation:

- CACP formulates and recommends price policies that aim to **promote agricultural production, encourage farmers to adopt modern technology, and ensure remunerative prices**.

Market and Price Analysis:

- The commission **analyzes market trends, price movements, and other relevant factors affecting agricultural commodities**.

Interactions with Stakeholders:

- CACP engages with various stakeholders, **including farmers, policymakers, and experts, to understand the challenges and dynamics of the agricultural sector**.

Reports and Publications:

- CACP prepares **reports and publications on agricultural price policies, cost of cultivation, and related topics**. These documents serve as valuable resources for policymakers and researchers.
- **Minimum Support Price (MSP):** MSP is the **minimum price set by the government at which it procures crops from farmers to support their income**. The objective is to provide farmers with a fair and remunerative price, ensuring stability in agricultural production.

Topic 34. SEBI ANNOUNCES DISCLOSURE NORMS FOR SHORT SALE TRANSACTIONS

Important for the subject: Economy

The Securities and Exchange Board of India (SEBI) has issued **new guidelines pertaining to the disclosure of short-sale transactions by institutional and retail investors**. The move comes in the wake of a Supreme Court directive to investigate alleged Adani Group stock manipulation.

Mandatory Disclosure:

- **Institutional Investors:** All institutional investors are required to **disclose short sale**

transactions upfront at the time of placing orders.

- **Retail Investors:** Retail investors must make a similar disclosure by the end of the trading day.

Supreme Court Ruling:

- The SEBI's decision is **prompted by the Supreme Court's order to investigate potential market manipulation related to short positions** during the publication of the Hindenburg report on Adani Group stocks.

Transparency and Informed Decision-making:

- The move is expected to **enhance transparency in the market** and facilitate informed decision-making among market participants.

Aggregate Short Interest Display:

- Exchanges will display aggregate short interest data for each stock daily, providing visibility into short selling activity.

Process Details:

- Brokers are mandated to **collect and upload scripwise short sell positions to exchanges before the next trading day.**
- This process aims to **increase visibility into short-selling activity, enabling better monitoring by regulators and contributing to more stable prices.**

Introduction of Securities Lending and Borrowing (SLB) Scheme:

- SEBI plans to **introduce a comprehensive SLB scheme concurrently with institutional investors engaging** in short selling.
- The SLB scheme is intended to **provide the necessary infrastructure to support short selling activities.**

Short Selling:

- Short selling is a **trading strategy where an investor sells borrowed securities with the expectation that the price will decline. The investor intends to buy back the same securities later at a lower price, returning them to the lender and profiting from the price difference.**

Example:

- **Borrowing Shares:** An investor borrows 100 shares of Company X from a broker.
- **Selling Shares:** The investor sells these borrowed shares in the market at the current market price.

- **Waiting for Price Decline:** The investor anticipates that the stock price of Company X will decrease.
- **Buying Back Shares:** If the stock price falls as expected, the investor buys back 100 shares at the lower price.
- **Returning Borrowed Shares:** The investor returns the 100 shares to the broker, completing the short sale transaction.

Profit or Loss:

- If the stock price falls, the investor makes a profit by buying back the shares at a lower price.
- If the stock price rises, the investor incurs a loss as they need to buy back the shares at a higher price than they sold them.

Naked Short Selling:

- Naked short selling occurs **when an investor sells shares without actually borrowing them or ensuring that they can be borrowed.**
- **This practice is generally considered illegal or highly regulated in many markets due to its potential for market manipulation.**

Example:

- **Selling Shares without Borrowing:** An investor sells 100 shares of Company Y without actually borrowing them from a broker.
- **No Ownership or Borrowing Agreement:** The investor doesn't own the shares and hasn't entered into any borrowing agreement.
- **Market Impact:** This creates artificial selling pressure in the market, potentially influencing the stock's price.
- **Buy-In Requirement:** If the shares are not delivered by the settlement date, the broker may be forced to buy them in the open market to fulfill the delivery requirement.

Key Differences:

- In short selling, **shares are borrowed before selling, while in naked short selling, shares are sold without borrowing.**
- Short selling is a legitimate trading strategy, **while naked short selling is often prohibited or strictly regulated to prevent market manipulation.**

Securities Lending and Borrowing (SLB):

- **Securities Lending and Borrowing (SLB) is a financial arrangement where one**

party (the lender) temporarily lends securities to another party (the borrower) in exchange for a fee.

- This arrangement allows investors to **earn additional income by lending their securities** to those who need them, **typically for short-selling purposes.**

Lender and Borrower:

- **Lender:** The entity or investor who owns the securities and is willing to lend them.
- **Borrower:** The entity or investor who borrows the securities for a specified period, usually to sell them in the market.

Collateral:

- The borrower provides collateral to the lender to secure the loan. **This collateral is usually in the form of cash or other securities and serves as a guarantee against any default by the borrower.**

Fee or Interest:

- The **borrower pays a fee or interest to the lender for the right to borrow the securities.** This fee compensates the lender for the temporary transfer of ownership.

Loan Period:

- SLB transactions have a **specified loan period, after which the borrower must return the borrowed securities to the lender.**

Securities Transfer:

- The **securities are transferred from the lender's account to the borrower's account** for the duration of the loan.

Risk Management:

- SLB transactions include **risk management measures to protect both parties, such as the requirement for collateral and the return of securities** at the end of the loan period.

Purpose of SLB:

Facilitate Short Selling:

- Borrowed securities are often used by investors who engage in short selling. **The borrower sells the borrowed securities with the expectation that their price will fall, allowing them to buy them back at a lower price.**

Liquidity Enhancement:

- SLB contributes to **market liquidity** by making additional securities available for borrowing, supporting various trading and investment strategies.

Income Generation:

- **Lenders earn additional income by charging fees or receiving interest** for lending their securities.

Arbitrage Opportunities:

- Traders may engage in SLB to **exploit price differentials between the cash and derivatives markets, taking advantage of arbitrage opportunities.**

Topic 35. CENTRE WILL BRING QUALITY NORMS FOR 2500 ITEMS SOON

Important for the subject: Economy

Union Commerce, Food and Consumer Affairs Minister Piyush Goyal has said that the Centre will soon **bring Quality Control Orders (QCO)** for about 2,500 items.

- Addressing a meeting on the **77th foundation day of the Bureau of Indian Standards (BIS)**. The minister said that there were **only 14 QCOs of 106 products** till 2014 and increased to around **156 QCOs of 672 products**.
- Complying with **high quality standards in products and services** will help India achieve high goals and become a developed nation.
- QCOs are being processed in nearly 2,500 more items which reflects the commitment towards quality by providing high standards goods and services.
- The initiative is inclined towards the **vision of ‘zero defect, zero effect’** to make products of high quality that are sustainable, eco-friendly and have zero climate impact. BIS recently agreed to invest **₹40 crore** to set up **21 labs for cotton testing**.

About Quality Council of India:

- QCI is a **non-profit organization registered under the Societies Registration Act XXI of 1860**.
- **The Department of Industrial Policy and Promotion, Ministry of Commerce and Industry** was designated as the nodal point for all matters connected with the Quality Council of India.
- **QCI was set up through a PPP model** as an independent autonomous organization with the support of Government of India and the Indian Industry represented by the three premier industry associations.
- (i) **Associated Chambers of Commerce and Industry of India (ASSOCHAM)**, (ii) **Confederation of Indian Industry (CII)** and (iii) **Federation of Indian Chambers of**

Commerce and Industry (FICCI).

- It plays a **pivotal role at the national level in propagating, adoption and adherence to quality standards** in all important spheres of activities

About PARAKH

- **PARAKH Portal was launched on 7th January 2022 by Secretary Higher Education, MoE-Government of India, for all AICTE approved institutes.**
- Vision of AICTE – SLA (PARAKH) is to **bridge the gap between academics and industry** by providing a platform for self assessment of knowledge.
- It will **enable policymakers and institutions to assess global competitiveness of students, faculty members and stakeholders** to trigger necessary interventions creating a more effective system of education in the country.

Topic 36. INDIA IN 2023: STRIDES IN CLIMATE ACTION, CRITICISM OF CONSERVATION

Important for the subject: Environment

India spurred meaningful action to **combat climate change and enhance wildlife conservation** in 2023, but criticism arose regarding the **cheetah translocation project and changes in forest and biodiversity laws.**

India's efforts to combat climate change:

- India proposed to **host the U.N. climate conference in 2028, or COP33**, and also launched a '**Green Credit Initiative**' focused on **creating carbon sinks** to address the challenges posed by a rapidly warming world.
- At the **climate summit in Dubai**, developing countries, including **India**, asked rich nations to vacate **carbon space** by achieving **negative carbon emissions** (removing more carbon dioxide from the atmosphere than emitted), not merely reaching **net zero by 2050**.
- A group of international scientists said in December **India's per capita carbon dioxide emissions rose by around 5% in 2022 to reach two tonnes** but these were still **less than half of the global average (4.7 tonnes)**.
- **India reduced GDP emission intensity by 33% between 2005 and 2019**, achieving the target **11 years in advance**.
- It also **created an additional carbon sink of 1.97 billion tonnes of CO2 equivalent** during this period.

Wildlife conservation:

- The **tiger population in India increased from 2,967 in 2018 to 3,682 in 2022**, showing a **six per cent annual rise**. **Madhya Pradesh** leads with **785 tigers**, followed

by **Karnataka, Uttarakhand, and Maharashtra.**

- While **tiger numbers increased** in some regions, **habitat loss, fragmentation, and poaching** led to **declines in the Western Ghats and Northeast-Brahmaputra Plains.**
- **Cheetah conservation** faced setbacks as **imported cheetahs developed unexpected winter coats** during **Indian summers**, causing **fatal infections.**
- **India** launched the **International Big Cat Alliance** to conserve **seven principal big cats**, including **tigers, lions, and cheetahs**, open to **97 countries** and organizations.
- **Forest law amendments** sparked criticism, **exempting certain forest lands** from protection laws. This move impacted states and traditional forest communities, prompting concerns about forest conservation.
- Changes to the **Biological Diversity Act** aimed to protect plants and resources, encouraging the **growth of medicinal plants** and easing research and patents.
- However, concerns arose as the **new law reduced penalties** for not sharing benefits with local communities holding traditional knowledge.

Topic 37. AMERICA'S CLIMATE FAILURE

Important for the subject: Environment

The United States is one of the biggest reasons for the world not able to meet 2030 targets. Loss and damage fund was opened for capitalisation at the COP 28 meeting in Dubai.

America Climate Failures:

- **Loss and damage fund:** US pledged contrastingly very low US \$17 Million as compared to other countries.
- The US has the **largest share in historical emissions** and the **world's biggest economy**, carrying a **greater burden** than any other nation against climate change.
- It neither ratified the **Kyoto protocol** nor abided by its emission reduction targets.

UNFCCC:

- The UNFCCC entered into force on **21 March 1994.**
- It has **near-universal membership** as **198 countries** that have ratified the Convention are called Parties to the Convention.

- Preventing “**dangerous**” human interference with the climate system is the ultimate aim of the UNFCCC.

Parties to UNFCCC are classified as:

ANNEX I

- There are **40 Annex I countries plus the European Union**. These countries are classified as industrialized countries and countries in transition.

ANNEX II

- There are **23 Annex II** countries plus the European Union. These countries are classified as developed countries which pay for the costs of developing countries.

Developing Countries

- Under the Kyoto Protocol, developing countries are not required to reduce emissions unless developed countries supply funding and technology.

Paris Agreement:

- The Paris Agreement is a **legally binding international treaty on climate change**. It was adopted by **196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015**. It entered into force on **4 November 2016**.
- Its objective is to hold “**the increase in the global average temperature to well below 2°C above pre-industrial levels**” and pursue efforts “**to limit the temperature increase to 1.5°C above pre-industrial levels**.”
- Since 2020, countries have been submitting their national climate action plans, known as **nationally determined contributions (NDCs)**.
- **NDCs** refers to the efforts **by each country to reduce national emissions and adapt to the impacts of climate change**.

Kyoto Protocol:

- The Kyoto Protocol was adopted on **11 December 1997**. It entered into force on **16 February 2005**. Currently, there are **192 Parties to the Kyoto Protocol**.
- The Kyoto Protocol operationalizes **the United Nations Framework Convention on Climate Change** by committing industrialized countries and economies in transition to limit and reduce greenhouse gasses (GHG) emissions in accordance with agreed

individual targets

- It **only binds developed countries**, and places a heavier burden on them under the principle of “common but differentiated responsibility and respective capabilities”
- The Protocol also offers them an additional means to meet their targets by way of three market-based mechanisms: **International Emissions Trading**

Clean Development Mechanism (CDM)

Joint implementation (JI)

About IPCC:

- **Establishment:** The IPCC was set up in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP)
- **Aim:** Its aim is to provide policymakers with regular assessments of the scientific basis of climate change

International Energy Agency:

- The International Energy Agency is a **Paris-based autonomous intergovernmental organization**, established in **1974**
- The **31 member countries and 13 association countries** of the IEA represent **75%** of global energy demand.
- IEA provides **policy recommendations, analysis and data** on the entire global energy sector.

Loss and Damage Fund:

- The L&D fund was first announced at the conclusion of **COP-27 in Sharm El-Sheikh, Egypt**.
- **COP 28** adopted the decision on the operationalization of **Loss and damage fund**.
- **Loss and damage** refers to the **negative consequences** that arise from the unavoidable risks of climate change, like rising sea levels, prolonged heat waves, desertification, the acidification of the sea and extreme events, such as bushfires, species extinction and crop failures. The fund aims to provide **financial assistance to nations most vulnerable and impacted by the effects of climate change**.

Adaptation Gap Report:

- The Adaptation Gap Report is released by the **United Nations Environment Programme**.
- The **2022 Adaptation Gap Report** indicates that international adaptation finance flows to developing countries are five to ten times below estimated needs

Topic 38. SNOW LEOPARD: ENIGMATIC BIG CAT OF HIGH ASIA NOW NATIONAL SYMBOL OF KYRGYZSTAN

Important for the subject: Environment

The **Snow leopard**, the mysterious and enigmatic symbol of High **Asia** with its host of mountain ranges stretching from the **Altai** to the **Himalayas**, is now the **national symbol** of **Kyrgyzstan**, a former Soviet Republic in Central Asia.

- **Inner Asia** comprises mountain ranges such as the Altai, Tian Shan, Nan Shan, Kunlun Shan, Pamir, Karakorum, Hindu Kush, and of course, the Tibetan Plateau and the Himalayas.
- This region is home to most of the snow and ice on Earth outside the poles. From this region, at least **15 rivers** fan out in every direction across the **Asian continent**.
- This '**Water Tower of Asia**' provides essential ecosystem services — it provides clean water for a third of the world's population. It is estimated to be warming at nearly two times the average rate of warming in the Northern Hemisphere.
- **Snow leopard conservation** received a boost a decade ago with the **Bishkek Declaration on Snow Leopard Protection** being **unanimously adopted** at the **World Snow Leopard Conservation Forum** in **2013**.

Snow Leopard range countries:

- The snow leopard's habitat range extends across the **mountainous regions of 12 countries across Asia:**
- Afghanistan, Bhutan, China, India, Kazakhstan, Kyrgyz Republic, Mongolia, Nepal, Pakistan, Russia, Tajikistan, and Uzbekistan.

Global Snow Leopard and Ecosystem Protection Programme (GSLEP):

- GSLEP is an unprecedented **alliance of all snow leopard range countries**, non-governmental organizations, multi-lateral institutions, scientists and local communities, united by **one goal**: saving the snow leopard and its mountain ecosystems.
- **Mission:** The snow leopard range countries agree, with support from interested organizations, to work together to identify and secure at least 20 snow leopard landscapes across the cat's range by 2020 or, "**Secure 20 by 2020.**"

World Snow Leopard Conservation Forum:

- On **October 22-23, 2013**, representatives of **12 snow leopard range countries** and the **international conservation community** gathered in **Bishkek, Kyrgyz Republic**, for the **Global Snow Leopard Conservation Forum**.
- Jointly organized by the Office of the President of the **Kyrgyz Republic** Almazbek

Atambayev and the **State Agency on Environmental Protection and Forestry** under the **Government of the Kyrgyz Republic**.

- The **objective of the Forum** is to discuss urgent actions and a new global strategy to address the conservation of the endangered snow leopard and its habitat in the critical ecosystems of Central Asia.
- The **Forum** is co-organized by **Global Tiger Initiative, NABU, Snow Leopard Trust, UNDP, and World Bank** and sponsored by **Global Environment Facility, Snow Leopard Conservancy, and WWF**.

Topic 39. DIP IN YIELD, LOW PROTEIN CONTENT: PAU FIELD EXPERIMENT FINDS SEVERAL PROBLEMS WITH NANO UREA

Important for the subject: Environment

A two-year field experiment by **Punjab Agricultural University (PAU)** studied **nano urea's efficacy** compared to **conventional nitrogen fertilizers** on **rice and wheat yields**.

Impact of Nano Urea on crops:

- **Nano urea** led to a **substantial decrease** in **grain nitrogen content** and **yields** for both crops. Research showed a **21.6% decline** in **wheat yield** and a **13% decrease** in **rice yield** compared to conventional fertilizers.
- **IFFCO** launched **nano liquid urea** claiming it could replace conventional urea, heavily promoted by the central government.
- **Nano urea**, a foliar spray, exhibited **reduced grain nitrogen content**, worrying for **India's staple food sources**.
- Despite claims of equivalent yield to conventional urea, **nano urea's cost** was **ten times higher** and **raised farmers' cultivation costs**.
- **Field experiments** revealed **decreased above-ground** and **root biomass** after **nano urea application**, affecting **nutrient uptake processes**.
- **Reduction in yield** was sequential over two years, suggesting continued nano urea use may further diminish production.
- The study, published in PAU's journal, emphasizes the need for **long-term evaluation**; current results discourage nano urea use for rice and wheat.

Topic 40. INDIAN LANDFILLS — A SOURCE OF MICROPLASTICS?

Important for the subject: Environment

If the landfills are not scientifically constructed and operated, they can act as a hub of

numerous kinds of contaminants including plastics.

- **Organic waste** such as **food waste** and **greens** at landfill sites **decomposes faster** with **microbial activities** under **aerobic** and **predominantly anaerobic conditions**, producing **leachate** and **gaseous emissions**. **Plastic items** are mainly **non-biodegradable** and **remain intact in landfills**.
- The **main sources of plastic in landfills** are disposable diapers, sanitary pads, carry bags, multi-layered packaging items, packaging sheets, container bottles, **polyvinyl chloride (PVC) pipes**, footwear, disposable cups and plastic utensils.

Formation of microplastics:

- **Microplastics** are **plastics of size** ranging from **greater than or equal to 1 micrometre to less than 5 millimetres** and can be categorised as **primary microplastics** (virgin or manufactured) and **secondary microplastics** (emitted by the degradation of larger plastics).
- Inside a **landfill** or a **dumpsite**, **complex biochemical reactions** result in **temperature fluctuations**, **high salinity**, **low pH** and the **generation of gases** such as **methane**, **carbon monoxide**, **carbon dioxide**, **ammonia** and **hydrogen sulphide**.
- These contribute to creating an environment conducive to the **disintegration of plastic items into smaller pieces**.
- In addition, **physical processes** such as **weathering of larger plastic particles** through **photo-degradation**, **thermal degradation**, **mechanical fragmentation** and **biodegradation** are also responsible for the formation of **microplastics**.
- They **enter landfills** primarily through **waste disposal of personal care products** and **pharmaceuticals**, **artificial textiles** and **raw industrial products**, as well as through **improper management practices** such as the **lack of a perimeter barrier** around the landfills and the **use of improper waste cover materials**.
- **Source of microplastics:** Nylon, pellets, foam, fragments, fibres / polyvinyl chloride and polyethylene.

Solution:

- The **Solid Waste Management Rules (2016)**, **Plastic Waste Management (Amendment) Rules, 2022** and the recent **ban on single-use plastics** and **extended producer responsibility policy** in India ensure that **plastic waste generation** is minimised and prohibits the cities from disposing of any combustible waste including plastics into the landfills.

Topic 41. IN A FIRST, A POLAR BEAR HAS DIED OF AVIAN FLU IN THE ARCTIC, CONFIRMS ALASKA

Important for the subject: Environment

The **Arctic region** recorded the **first case of a polar bear death** due to **Highly Pathogenic Avian Influenza (HPAI)**, confirming a concerning development.

- The **polar bear**, found deceased near **Utqiagvik** in **Alaska**, highlights the **vulnerability of these bears**, listed as “**vulnerable**” due to **habitat loss**—specifically, **diminishing sea ice**—on the **IUCN Red List**.
- The **death of the polar bear** was **confirmed** in December 2023 after samples collected in October **tested positive for the virus**.
- Although polar bears primarily **hunt seals**, **scavenging on dead birds** likely exposed this bear to the **influenza virus**, this case emphasizes the **virus’s survival on deceased animals in cold conditions**.

Highly pathogenic Avian Influenza (HPAI):

- The viral disease **HPIA** or **avian influenza**, especially the **H5** and **H7 strains**, mostly **affects birds**.
- These **strains are highly pathogenic** and have been **reported in domestic poultry**, resulting in high mortality if they manage to reach wild bird populations.
- It spreads among **birds** and **mammals** due to **predators** and **scavengers feeding on infected birds**. **Marine mammals** have also been found to be infected.

Threatened species from HPAI:

- Avian groups like gulls and skuas, birds of prey such as hawks and caracaras, terns and shorebirds. Among marine mammals, fur seals, sea lions, southern elephant seals and dolphins.

HPAI in the polar region:

- The **HPAI strain 2.3.4.4b**, causing widespread mortality among birds and mammals worldwide, emerged in the **Arctic** in April 2023.
- Initially detected among **birds** and a **fox**, it quickly spread, infecting **chickens, ducks**, and **various bird species** in different regions, including **bald eagles** and **Canada geese**.
- **HPAI**, initially reported in **poultry in 2021**, spread rapidly among **wild birds** and reached the **Antarctic region** by **October 2023**, infecting **brown skuas**.
- Scientists fear the virus could spread among **dense penguin populations** during the **Southern Hemisphere’s spring**, potentially causing a **significant ecological**

disaster.

About the Polar bear:

- **Native to the Arctic**, is the **largest bear species** and **land carnivore**.
- **Close relative** to the **brown bear**, they're sexually **dimorphic**, with males significantly larger than females.
- Their **white or yellowish fur**, **black skin**, and **fat layer** help adapt to **Arctic conditions**. They have **specialized teeth and large paws for walking on ice and swimming**.
- They're **terrestrial** and **ice-dependent**, considered **marine mammals** due to their reliance on marine ecosystems.
- Prefer annual sea ice but live on land when it melts; primarily carnivorous, **specializing in preying on seals**.
- Classified as a "**vulnerable**" species due to threats like **climate change, pollution, habitat loss and energy development**.
- Increased time on land raises conflicts with humans; historically hunted for their coats and other items.

Topic 42. NAMIBIAN CHEETAH AASHA GIVES BIRTH TO 3 CUBS IN KUNO; 'INDICATOR THAT ANIMALS ARE ACCLIMATISING'

Important for the subject: Environment

Aasha, a **Namibian cheetah** at **Kuno National Park** in **Madhya Pradesh**, has given birth to **three cubs**. **Aasha**, known for her confident nature, arrived at the park in **September 2022** and has adapted well, travelling over 200 km in the wild.

- Suspected to be pregnant after interaction with a male cheetah, **Aasha** has faced challenges in the past, including an encounter with villagers.
- The government is hailing it as a **success for Project Cheetah**. Wildlife officials see the cubs' birth as a positive sign, **indicating the cheetahs' acclimatization to the Indian habitat**, and **expressing confidence in their survival**.
- However, concerns arise regarding the **birth occurring in an enclosure rather than in the wild**, limiting exposure to natural pressures and potential learning experiences.
- The birth marks a significant milestone amid the relocation of **20 cheetahs to Kuno National Park** from **Namibia and South Africa**, despite **six deaths since March 2023**.

About Cheetah:

- The **cheetah (Acinonyx jubatus)** is a large cat **native to Africa and central Iran**.
- It is the **fastest land animal**, estimated to be capable of running at 80 to 128 km/h. There

are **four recorded subspecies of Cheetahs.**

- The cheetah is threatened by several factors such as habitat loss, conflict with humans, poaching and high susceptibility to diseases.

African Cheetah	Asiatic Cheetah
IUCN status	They are vulnerable under the IUCN Red List.
Distribution	Around 6,500-7,000 African cheetahs present in the wild.
Characteristics	They are bigger in size as compared to Asiatic Cheetah.
IUCN status	The Asiatic cheetah is classified as a “critically endangered” species by the IUCN Red List.
Status in India	The Asiatic Cheetah was declared extinct in India in 1952
Distribution	They are only 40-50 and found only in Iran.
Characteristics	Smaller and paler than the African cheetah.

Topic 43. COP28 CLIMATE SUMMIT

Important for the subject: Environment

Some important initiatives/pledges launched during the COP28 climate summit:

Sr. No	Name	Sector	Purpose	Signatories	India's position
1.	GLOBAL ELECTRIC COOKING COALITION (GECCO)	Energy	Promote transition to electric cooking by providing action plans and mobilising finance.	At least 10 countries in sub-Saharan Africa, Asia, Latin America and the Caribbean	Is a signatory
2.	OIL & GAS DECARBONIZATION CHARTER	Energy	To call on industry to pursue net zero by or before 2050, zero out methane emissions, eliminate routine flaring by 2030	30 national oil companies and 20 independent oil companies	India's Oil and Natural Gas Corporation Limited has signed up
3.	GLOBAL RENEWABLES AND ENERGY EFFICIENCY PLEDGE	Energy	Triple worldwide installed renewable energy generation capacity and double energy efficiency by 2030	123 countries	Not a signatory Disinclined to sign a pledge that asks for a phase-down of coal power

4.	GLOBAL COOLING PLEDGE	Energy	To reduce cooling-related emissions across sectors by at least 68 per cent globally relative to 2022 levels by 2050	63 countries	Not a signatory. With low per capita emissions and energy consumption, and cooling needs set to rise, India might not want to commit to investments that will raise cooling costs
5.	DECLARATION TO TRIPLE NUCLEAR ENERGY	Energy	Triple nuclear energy capacity globally by 2050	25 countries	Not a signatory. The position is unclear. The government is increasing nuclear power capacity threefold by 2031-32
6.	COP28 DECLARATION ON FOOD AND AGRICULTURE	Food	Scale up adaptation and resilience activities	159 countries	Not a signatory. A probable concern could be that the declaration calls for revisiting agriculture policies to reduce greenhouse gas, restricting small and marginal farmers, threatening food security

7.	COALITION FOR HIGH AMBITION MULTI-LEVEL PARTNERSHIPS FOR CLIMATE ACTION	Climate action	Planning, financing, and monitoring climate strategies to further enhance Nationally Determined Contributions (NDCs ahead of COP30)	71 countries	Not a signatory. The declaration calling for targets and actions for emissions mitigation to enhance NDCs could be a cause of concern
8.	COP28 UAE DECLARATION ON CLIMATE AND HEALTH	Health	Build more climate-resilient health systems, promote steps to curb emissions in the health sector, and increase finance	123 countries	Not a signatory. Lack of practicality in curbing greenhouse gases in cooling in the health sector is the likely cause for not signing.
9.	UAE LEADERS' DECLARATION ON A GLOBAL CLIMATE FINANCE FRAMEWORK	Finance	Ensuring climate finance is available, affordable, and accessible	14 countries	A signatory
10.	JOINT DECLARATION ON OCEAN AND CLIMATE ACTION	Ocean	Sustainably manage 100 per cent of their national ocean jurisdictions, adopt ocean-based action in national climate goals	18 countries and the General Secretariat of the Organization of American States	Not a signatory; reason unclear
11.	CLIMATE CLUB	Industry	Decarbonisation of industries, access to finance to developing countries	35 countries + EU Not a signatory.	Developing countries still need to industrialise and decarbonisation could increase the cost.

Topic 44. MAYURBHANJ'S RED ANT CHUTNEY RECEIVES GI TAG. WHY THIS IS IMPORTANT FOR NUTRITIONAL SECURITY OF TRIBALS

Important for the subject: Environment

Similipal kai chutney, made with **red weaver ants** by tribal people in Odisha's Mayurbhanj district, received the **geographical identity tag**.

- The **Mayurbhanj Kai Society Ltd** applied in 2020 under the **Geographical Indications of Goods Act, of 1999**.
- Scientists analyzed the **red weaver ants**, revealing **nutritional benefits** like **proteins, vitamins, and minerals**.

Similipal kai chutney:

- Ants are gathered, cleaned, and mixed with ingredients like salt, ginger, garlic, and chillies to make the chutney. Additionally, they're used in soups and consumed as a functional ingredient for health issues.
- Consumption is linked to **improved appetite, eyesight, brain health, and natural remedies** against **depression, fatigue, and memory loss**. **Kai pimpudi** is used in **medicinal oil** for **rheumatism, gout, etc.** It's also consumed for **health benefits**, aiding **immunity and disease prevention**.
- Indigenous people collect **kai pimpudi (red weaver ants)** from nearby forests, selling them and the **chutney** at high demand and profitable rates.

Kai pimpudi (Red weaver ants):

- **Red weaver ants** create nests in **trees**, forming **colonies** with various nests, providing protection, and serving as **bio-control agents against pests**.

Legal Framework:

- **Geographical indications** assign products to the **place of their origin**. It conveys an assurance of **quality** and **distinctiveness** for such goods.
- Under **Articles 1 (2) and 10** of the **Paris Convention for the Protection of Industrial Property**, **geographical indications** are covered as an element of **Intellectual Property Rights**.
- They are also covered under **Articles 22-24** of the **Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement**.

How does a GI tag affect the community based dish?

- A **Geographical Indications (GI) tag** will help put the **savoury dish** to the **global food table**.

- The tag will bring about the uniqueness in the dish's identity- meaning- it will be recognised as the one dish found in a particular country.
- This will patent Kai Chutney and therefore make it harder for anyone else to misuse the identity of kai or mislead customers.

Simlipal National Park:

- Simlipal is a **tiger reserve in the Mayurbhanj district in the Odisha.**
- It is **part of the Mayurbhanj Elephant Reserve**, which includes **three protected areas** –**Similipal Tiger Reserve, Hadgarh Wildlife Sanctuary and Kuldiha Wildlife Sanctuary.** It **derives its name from the abundance of red silk cotton trees** growing in the area.
- The vast terrain of Similipal with wide altitudinal, climatic and topographic variations, criss-crossed by a large number of perennial streams, harbours a **unique blend of Western Ghats, Eastern Ghats and Sub-Himalayan plant species.**
- The floristic composition indicates a **connecting link between South Indian and North Eastern Sub-Himalayan Specie**
- Forest is **predominantly moist mixed deciduous forest with tropical semi-evergreen forest in areas** with suitable microclimatic conditions and sporadic patches of dry deciduous forests and grasslands. It forms the **largest watershed of northern Odisha.**
- It holds the **highest tiger population in Odisha** and harbours the **only population of melanistic tigers in the world.**
- Other carnivores found here are **leopards, leopard cats, fishing cats, jungle cats and wolves.** The active **management of muggers** has revived its population on the banks of the rivers Khairi and Deo.
- It is also **home to the largest population of elephants in Odisha.** This protected area has been **part of the UNESCO World Network of Biosphere Reserves** since 2009.

Topic 45. 'INDIA'S OLDEST' SLOTH BEAR IN CAPTIVITY DIES IN BHOPAL ZOO

Important for the subject: Environment

A 36-year-old male **sloth bear** died due to **multi-organ failure** at a **zoo-cum-animal rescue centre** in **Bhopal.**

- The bear, named Bablu, was the **oldest one in captivity** in the **country** and died at the **Van Vihar National Park.**

Sloth Bears:

- It is a **Myrmecophagous** bear species.

Distribution:

- They are **endemic to the Indian sub-continent** and 90% of the species population is found in India with small populations in Nepal and Srilanka.
- It occurs in a wide range of habitats including **moist and dry tropical forests, savannahs, scrublands and grasslands** below 1,500 m (4,900 ft) on the Indian subcontinent, and below 300 m (980 ft) in Sri Lanka's dry forests. It is **regionally extinct in Bangladesh**.
- Sloth bears are found in all parts of the country **except Jammu and Kashmir and northeastern States**.

Characteristics:

- They are **nocturnal animals**.
- It feeds on fruits, ants and termites.
- Sloth bears **do not hibernate**.

Protection Status

- IUCN red list: listed as '**vulnerable**'
- Wildlife Protection Act of India, 1972: **listed under Schedule I**

Threats:

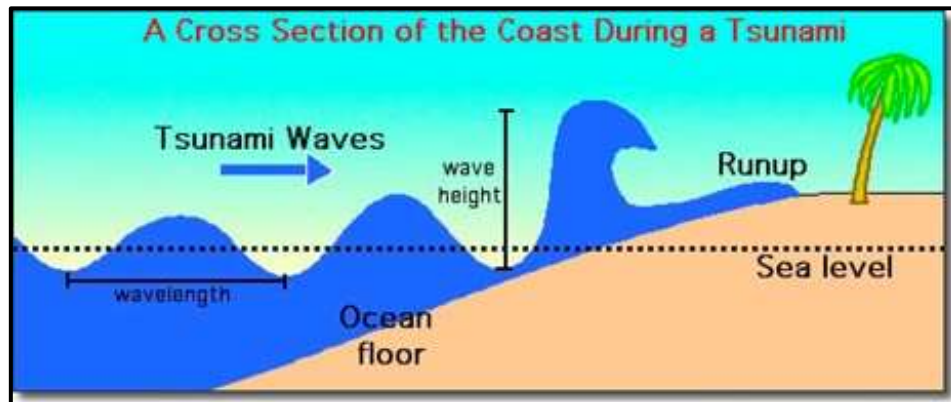
- **Animal-Human conflict:** Over the past few years there has been a rise of incidents of human sloth bear conflict in States like Gujarat, Rajasthan and Maharashtra among other states.
- **Exploitation:** Sometimes captured **and kept as pets**, which can lead to their exploitation and mistreatment.

Van Vihar National Park:

- Located in **Bhopal, Madhya Pradesh**
- It is situated right next to the famous **Upper Lake of Bhopal** also known as the "**Bada Talab**" which is a **Ramsar Site** and one of the two lakes of **Bhoj Wetland**.
- Van Vihar is a part of the **Upper Lake catchment area** which checks siltation and contributes to pollution-free water in the lake, one of the major sources of water for the city.

Topic 46. JAPAN EARTHQUAKE TRIGGERS TSUNAMI WARNING: WHAT IS A TSUNAMI, WHY DOES IT KEEP FORMING IN THE ISLAND COUNTRY?

Important for the subject: Geography



Tsunami waves hit several parts of **Japan's coastal areas** and urgent evacuation warnings were issued after a **7.6-magnitude earthquake** shook the country's north-central region.

Tsunami:

- **Tsunami** (a Japanese word that means “harbour wave”) is a series of **giant ocean waves** caused by **earthquakes** or **volcanic eruptions** under the ocean.
- When an earthquake occurs **under the ocean**, a large chunk of the ocean floor can suddenly move upward or downward, leading to a **sudden displacement of a large volume of water**, thereby causing **tsunami waves**.
- Similarly, the **lava** flowing out of the **volcano** displaces the water around it and that water can become a large wave. Other factors that can cause tsunamis are- **landslides, meteorites and asteroid impacts**.

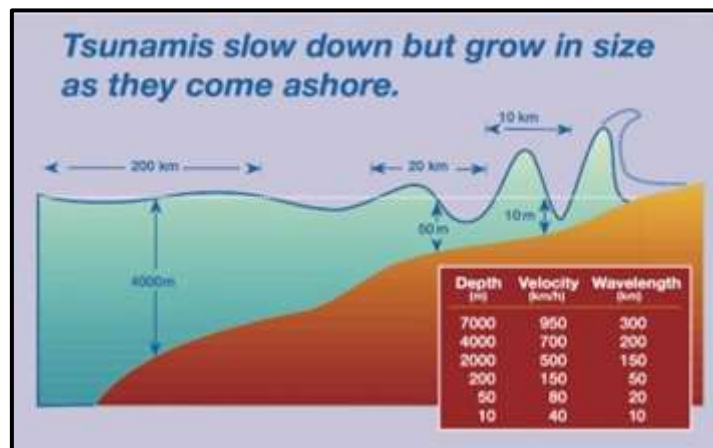
Characteristics:

- The formation of a tsunami can depend on a host of **factors**, including the shape of the ocean floor, and the earthquake's distance and direction.
- **Tsunami waves** can be **hundreds of feet tall** and can travel as fast as **jet planes** over **deep waters** while **slowing down** when reaching **shallow waters**.

Not all earthquakes or volcanic eruptions lead to tsunamis.

- Tsunamis generated in the open ocean appear to be only small waves. Tsunami waves become dangerous only when they get close to the coast.
- An increase in wave amplitude results in “shoaling” when waves, including tsunamis, run from deep to shallow water. This is significant in coastal regions.
- This phenomenon occurs because of the force from the seabed as it becomes shallower.

This slows down the wave: the shallower the water, the slower the wave.



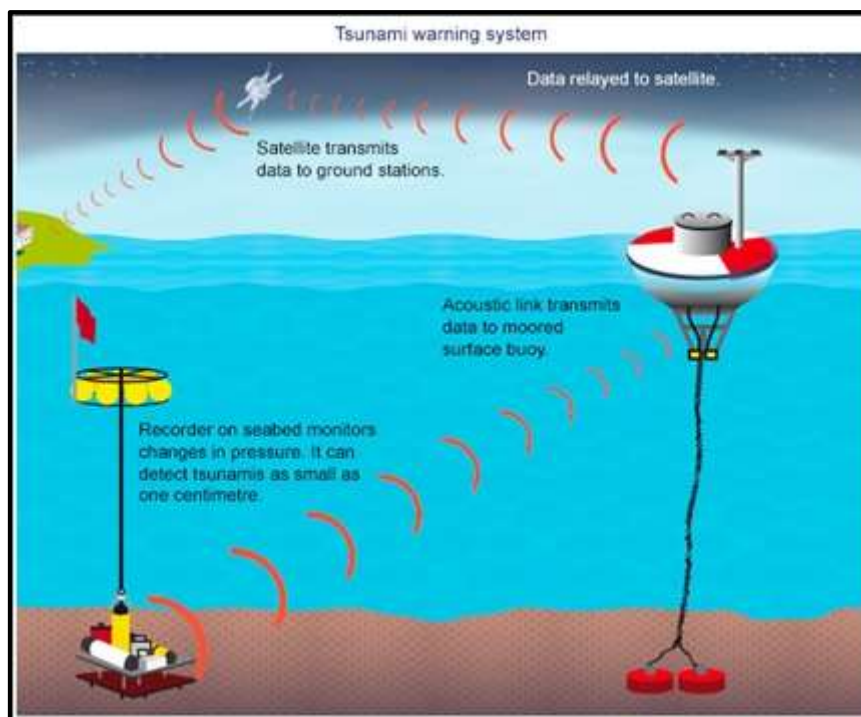
Why is Japan prone to earthquakes and tsunamis?

- **Japan** is situated along the '**Pacific Ring of Fire**', which is the **most active earthquake tectonic belt** in the world.
- The 'ring' refers to "an imaginary **horseshoe-shaped zone** that follows the **rim of the Pacific Ocean**", where many of the world's earthquakes and volcanic eruptions occur.
- Within the **Ring of Fire**, there are different **tectonic belts**, including the **Pacific Plate**, **Eurasian Plate**, and **Indo-Australian Plate**, which keep **meshing and colliding** with each other, causing **earthquakes, volcanic eruptions and tsunamis**.
- The **2011 tsunami waves in Japan** led to a **nuclear meltdown** at the **Fukushima power plant**, causing the most severe nuclear accident since the **1986 Chornobyl disaster** in the **Soviet Union**.



Tsunami early warning system:

- The **tsunami early warning system** is crucial in **mitigating the devastating impact of these powerful waves** that can reach heights of 66ft (20m) and travel at speeds exceeding 400 miles per hour (644 km/hr).
- It consists of two key components: a **sensor network** to detect tsunamis and a **communication infrastructure** for timely alarms and coastal evacuation.
- This system relies on **seismic-monitoring stations** and **sea-level gauges** to detect **earthquakes and abnormal sea-level changes**, helping scientists confirm a tsunami's occurrence.
- Despite its effectiveness, the system has **limitations** as it depends on **physical measurements from buoys**, and it **can't prevent sudden tsunamis** that occur very close to the epicentre.
- Efforts to enhance warning procedures include assessing t-wave energy as an indicator of earthquake-induced tsunami potential, but current systems still face challenges in providing instantaneous protection against rapidly approaching tsunamis.



Meteotsunami:

- Meteotsunamis are **large waves** and unlike tsunamis triggered by seismic activity, **meteotsunamis are driven by air-pressure disturbances** often associated with **fast-moving weather events**, such as **severe thunderstorms, squalls**, and other

storm fronts.

- The storm generates a wave that moves towards the shore and is amplified by a shallow continental shelf and inlet, bay, or other coastal features. **Meteotsunamis** have been observed to reach **heights of 6 feet or more**.
- They occur in many places around the world, including the **Great Lakes, the Gulf of Mexico, the Atlantic Coast, and the Mediterranean and Adriatic Seas**.

Topic 47. PM MODI SET TO UNVEIL NORTH INDIA'S FIRST RIVER REJUVENATION PROJECT 'DEVIKA'

Important for the subject: Geography

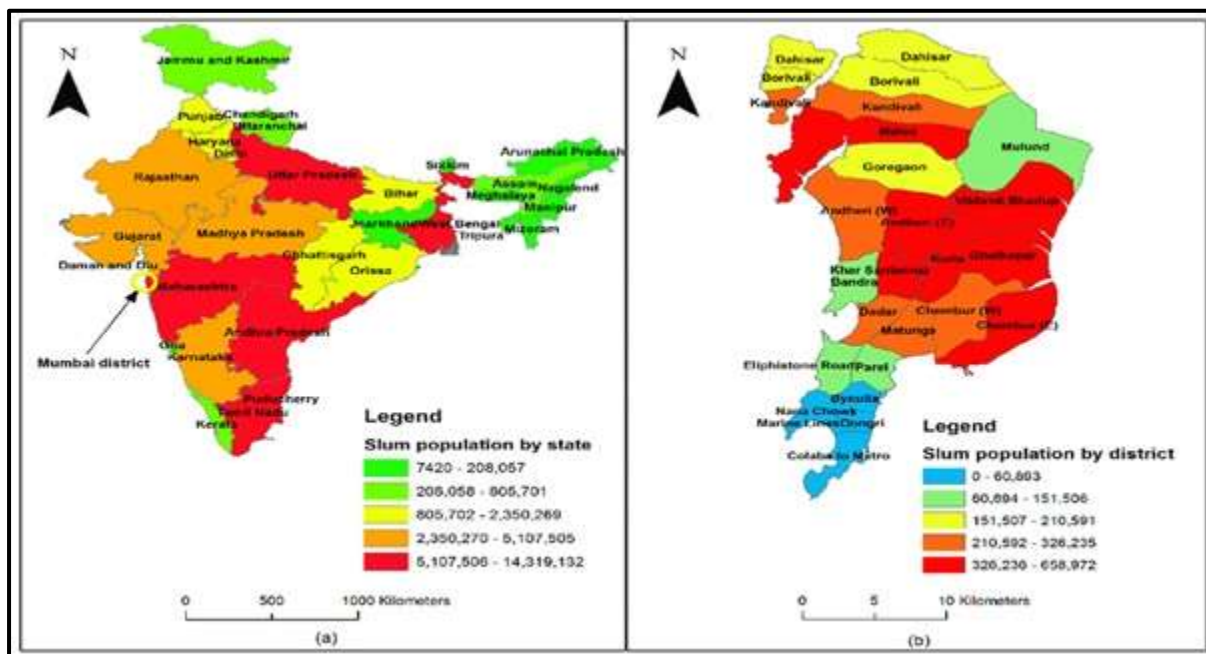
North India's first river rejuvenation project 'Devika' is in the final stages.

Built on the lines of 'Namami Ganga', the project was **launched** by the Prime Minister in February **2019**.

- **Devika River**, considered the **sister** of the **sacred river Ganga**, is undergoing a significant initiative called the **Devika Rejuvenation Project**.
- **Devika River** originates from the **hilly Suddha Mahadev temple** in the **Udhampur district of Jammu and Kashmir** and flows down towards **western Punjab (now in Pakistan)** where it **merges** with the **Ravi River**.
- The project aims to **maintain the river's sanctity** through **Liquid Waste Management (LWM)** and **Solid Waste Management (SWM)** systems in **Udhampur, Jammu & Kashmir**.
- Managed by the **Urban Environmental Engineering Department (UEED)**, the **LWM** project includes a network of pipes and manholes connecting households.
- It's a substantial investment, totalling over Rs 190 crore, with **funding split 90:10** between the **central government** and the **Union Territory (UT)**. Alongside the **LWM**, the **SWM project** is critical for safeguarding the river's sanctity.
- The comprehensive plan involves constructing sewage treatment plants of various capacities (8 MLD, 4 MLD, and 1.6 MLD), a 129.27 km sewerage network, development of cremation ghats, protection measures like fencing and landscaping, small hydropower plants, and three solar power facilities.
- The completion of these projects is anticipated to significantly **reduce pollution** and **enhance the overall water quality of the rivers** involved.

Topic 48. SCHEMES FOR SLUM DWELLERS AND URBAN POOR

Important for the subject: Geography



One in every six urban Indians lives in slums. In Andhra Pradesh one in every three urban households is a slum.

Nine out of every 10 slum households in Odisha are either without a drainage connection or connected to an open drain.

About Slums:

- According to the 2011 census, around 6.5 crore of the Indian population live in slums, of which 1.18 crore live in Maharashtra. The present population living in the Indian slum is more than the British population.
- Some of the world's largest slums exist in India like **Dharavi Slum of Mumbai**, **Bhalswa Slum of Delhi**, **Nochikuppam slum (Chennai)**, **Rajendra Nagar Slum (Bangalore)** and **Basanti Slum (Kolkata)**.
- Slums are so common that they are found in **65 per cent** of the Indian towns. The number of slums has reduced from **51,688 in 2002 to 33,510 in 2012** as per **58th and 69th round Survey of National Sample Survey Office (NSSO)** on urban slums respectively.

Regional Distribution in the country:

- **Nine states have higher slum** populations than the national average. Andhra Pradesh with **1% of its urban population living in slums**, tops the list.

- Other states are: Chhattisgarh, Madhya Pradesh, Maharashtra, Odisha, West Bengal, Sikkim, Jammu & Kashmir and Haryana.

Problems Faced by Slums:

- **According to State of India's Environment in Figures 2019**, a huge chunk of slum households in Odisha do not have access to treated tap water (64.9%) and are either without a drainage connection or connected to an open drain (90.6%).
- **Six out of 10 slum dwellers** live close to unsanitary drains and almost four of every 10 do not get treated water.
- Majority of the residents are rickshaw pullers, sex workers, small seasonal vendors, house maid servants with a family income ranging from Rs 1500 to Rs 3000.
- **11, 92, 428 out of 137, 49, 424 slum households** depend on untreated water for drinking. **63% slum households in India** are either without a drainage connection or are connected to open drains.

Responsibility of center and state:

- **Development of urban infrastructure is a State Important for the subject:** It is the responsibility of the States / Union Territories (UTs) to frame policies and implement schemes for improving the quality of life for all including the poor and the disadvantaged people residing in its cities.
- **Land and colonization are State Important for the subjects.** The schemes related to housing including rehabilitation of slum dwellers are implemented by States/ Union Territories (UTs).
- **Public health and sanitation are State Important for the subjects.** The primary responsibility of strengthening public health and sanitation in all urban areas including slums lies with the respective State/UT Governments.

Initiatives taken by Government:

- **Pradhan Mantri Awas Yojana (Urban): Central Assistance of Rs. 1 lakh per house** is admissible for all houses built for eligible slum dwellers under the component of ISSR using land as Resource with participation of private developers.
- Eligible beneficiaries can avail the benefit of PMAY-U through available **four verticals i.e. Beneficiary-led Construction (BLC), Affordable Housing in Partnership (AHP), In-Situ Slum Redevelopment (ISSR) and Credit Linked Subsidy Scheme (CLSS).**
- **The ISSR** component of the Scheme specifically deals with slum redevelopment using land as a resource.
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT):** AMRUT was launched on 25th June 2015 with focus on the development of basic urban infrastructure in the sectors of water supply, sewerage and septage management, storm water drainage,

non-motorised urban transport and development of green spaces and parks in 500 selected cities across the country.

- **Swachh Bharat Mission-Urban (SBM):** The Swachh Bharat Mission (SBM) was launched in It aims to **eradicate Manual Scavenging** by converting insanitary toilets to sanitary. Modern and Scientific Municipal Solid Waste Management.
- **National Health Mission:** The mission was launched in **2013** **subsuming National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM).**
- The NHM envisages achievement of universal access to equitable, affordable & quality health care services that are accountable and responsive to people's needs.
- NHM encompasses its two Sub-Missions, The National Rural Health Mission (NRHM) and The National Urban Health Mission (NUHM).
- **Jawaharlal Nehru National Urban Renewal Mission (JNNURM)** launched in 2005 by the Ministry of Housing and urban affairs.
- It consists of two subcomponents namely **Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT)** and **Urban Infrastructure and Governance (UIG).**
- The UIDSSMT and UIG component was for infrastructure development with Central Assistance (CA) in small and medium towns of the States/Union Territories (UTs), whereas UIG component was for infrastructure development with central assistance in large Cities.

Topic 49. GREAT NICOBAR PROJECT PHASE TO COST 18000 CR

Important for the subject: Geography



Greenfield port at Galathea Bay:

Greenfield port at Galathea Bay's first phase is estimated at **18,000 crore**. **Phase 1** to have **4 million TEUs** capacity and a draft of over 20 meters.

- Overall project in **four phases** aiming at **16 million TEUs** by **2058;43,000 crore estimated cost**.
- Includes breakwaters, dredging, berths, storage areas, utilities, equipment procurement, and port colony development.
- **Landlord model** supported by the government; scheduled completion in **2028**.

Strategic Importance:

- The **Galathea Bay Port**, due to its **strategic location** in **proximity** to the **East-West shipping corridor** of the world, is suitable to attract both gateway and **trans-shipped cargo** located strategically between **Singapore** and **Colombo** – two major **trans-shipment ports** on the **international sea trade/shipping Route**.
- Aims to handle **trans-shipment cargo**, acting as a **feeder** to **major ports** and facilitating **trade** with **Bangladesh** and **Myanmar**.

Improvement in Other Ports:

- Plans to enhance **draft capacity** in **Deendayal, Vadhavan, Tuticorin, Paradeep, Navi Mumbai, Cochin, and Jawaharlal Nehru Port** for **larger vessel access** by **2030** and **2047**.

Great Nicobar is home to:

- Two national parks (**Galathea Bay** and **Campbell Bay NPs**), A biosphere reserve (**Great Nicobar BR**).
- The **Shompen** and **Nicobarese tribal peoples**, and **Ex-servicemen** from **Punjab, Maharashtra, and Andhra Pradesh** who were settled on the island in the **1970s**.

Galathea Bay National Park:

- It is a national park **located** in the Union Territory of **Andaman and Nicobar Islands, India**.
- It is located on the **island of Great Nicobar** in the **Nicobar Islands**, which lie in the **eastern Indian Ocean (Bay of Bengal)**.

Flora:

- The vegetation consists largely of **tropical and subtropical moist broadleaf forests**.

Fauna:

- Notable animal species found in the park include the **giant robber crab**, **megapode** and **Nicobar pigeon**.
- The largest turtle in the world, the **leatherback turtle** (*Dermochelys coriacea*), nests here.

Topic 50. VIBRANT GUJARAT TO SEEK INVESTMENTS FOR TOURISM

Important for the subject: Geography

The **10th Vibrant Gujarat Global Summit (VGGS)** is scheduled to be held from January 10 to 12, 2024, at the **Mahatma Mandir Convention and Exhibition Centre** in **Gandhinagar, Gujarat, India**.

- For **floating villas**, Gujarat has identified two **dam sites**, **Kadana** and **Dharoi**, and the **island of Beyt Dwarka** in the **DevBhumi Dwarka district**.
- **Dharoi dam** is on **Sabarmati river** and **Kadana dam** is on **Mahisagar river**. Both are hotspots for birdwatchers.
- The **Glass viewing or observation decks** over the **Kadana** and **Dharoi dams** are planned on the lines of the **Grand Canyon of the USA**.

Island of Beyt Dwarka:

- **Beyt Dwarka** or **Shankhodhar** is an inhabited island at the mouth of the **Gulf of Kutch**, situated 2 km (1 mi) off the coast of the town of **Okha, Gujarat, India**, and 25 km (16 mi) north of the city of **Dwarka**.
- The island's name "**Shankhodhar**" derives from the fact that the **island is a large source of conch shells**.
- The **island of Beyt Dwarka** is currently accessible only through ferry services from **Okha** on the mainland.
- A **2.3 Km Signature bridge** is being built over the sea to connect **Okha** with **Beyt Dwarka**.

Sabarmati River:

- **Major west-flowing river in India**, originating in **Aravalli Range, Udaipur District, Rajasthan**.
- Travels 371 km in a **south-westerly direction**, meeting the **Gulf of Khambhat** of the **Arabian Sea**. Spans 48 km in **Rajasthan** and 323 km in **Gujarat**.

Course:

- Enters **Gujarat**, joined by **left bank tributary Wakal** near **Ghonpankhari**.
- Joins the **right bank tributary Sei River**, followed by the **left bank tributary Harnav**

River. Flows into **Dharoi reservoir**, meeting **left bank tributary Hathmati River**.

- Passes **Ahmedabad**, joined by **left bank tributary Watrak River**. Finally drains into the **Gulf of Khambhat, Arabian Sea**.

Mahisagar River:

- Located in western India, **originating in Madhya Pradesh**, flowing through **Rajasthan**, and reaching **Gujarat** before entering the **Arabian Sea**.
- Among the few west-flowing rivers in India, alongside the **Luni, Sabarmati, Tapi**, and **Narmada rivers**.

Geographical Features:

- Originates near **Minda Village** in **Dhar district, Madhya Pradesh**.
- Begins in the **western Vindhya Range**, south of **Sardarpur**, flowing northward through **Madhya Pradesh**, then turning northwest into **Rajasthan**, and finally southwest through **Gujarat**. Empties into the sea through a **wide estuary** before **Khambhat** after a 360-mile (580-km) course.

Impact and Characteristics:

- Silt deposited by the **Mahi** contributes to the **shallowing of the Gulf of Khambhat**, impacting the region's ports.
- Despite its size, the **riverbed's lower elevation** compared to land **limits its usefulness for irrigation**.
- Notably crosses the **Tropic of Cancer twice**. Known as "**Mais**" in **Ancient Greek**.

Topic 51. PENDENCY DOWN, BUT PETITIONERS DISAPPOINTED IN MANY CASES

Important for the subject: Polity

The year 2023 saw the Supreme Court form Constitution Benches almost back-to-back to hear long-pending and contentious cases like the abrogation of **Article 370, same-sex marriage** and **demonetisation**, but the results have left petitioners disappointed.

Constitutional bench

- A constitution bench consists of at **least five or more judges** of the court which is set up to decide substantial questions of law with regard to the interpretation of the constitution in a case.
- The provision for a constitution bench has been provided in the Constitution of India under **Article 143**.
- It is the Chief Justice of India who is constitutionally authorized to constitute a

constitution bench and refer cases to it.

Constitution benches are set up when the following circumstances exist:

- When a case involves a substantial question of law pertaining to the interpretation of the Constitution [Article 145(3)].
- Article 145(3) provides, “The minimum number of Judges who are to sit for the purpose of deciding any case involving a substantial question of law as to the interpretation of this Constitution or for the purpose of hearing any reference under Article 143 shall be five.”
- When President of India has sought the Supreme Court’s opinion on a question of fact or law under Article 143 of the Constitution. Article 143 of the Constitution provides for Advisory jurisdiction to the Supreme Court of India.
- As per the provision, the President of India has the power to address questions to the Supreme Court, which he deems important for public welfare.
- The Supreme Court upon reference advises the President by answering the query. However, such referral advice by the apex court is not binding on the President, nor is it ‘law declared by the Supreme Court’.
- When two or more three-judge benches of the Supreme Court have delivered conflicting judgments on the same point of law, necessitating a definite understanding and interpretation of the law by a larger bench. The Constitution benches are set up on ad hoc basis as and when the above-mentioned conditions exist.

Topic 52. GOVERNMENT E-MARKETPLACE (GEM): TRANSFORMING PROCUREMENT DYNAMICS

Important for the subject: Polity

Evolution of GeM:

GeM, initially focused on general store items has expanded its scope. **Now, it brings together defense PSUs Bharat Dynamics Ltd (BDL) and Bharat Electrical Ltd (BEL) for procurement.**

Specific Procurement Details:

- **BDL, specializing in Akash missiles, procured radars and ground support systems from BEL.**
- The procurement for Akash missiles is valued at ₹4,415 crore.

Involvement of Defense PSUs:

- Defense PSUs are not only buying through GeM but also selling items.
- Goods traded include simulators, drones, bulletproof jackets, and ballistic helmets.

Significant Benefits of GeM:

- Beyond transaction savings, **GeM reports substantial benefits due to end-to-end digital journeys.**
- **Savings in advertising costs, printing costs, travel costs, and maintenance of in-house portals.**

Initiatives for Customer Satisfaction:

- Use of custom bids encouraged for goods not available on GeM.
- **Pre and post-dispatch inspection of goods by Quality Assurance and NABL-accredited labs. Timely online payment ensures 99% satisfaction rate.**
- GeM ensures that 25% of orders go to MSMEs.
- **Government e-Marketplace (GeM): Revolutionizing Procurement in India**
- **GeM is an online platform launched by the Indian government to facilitate e-commerce for procurement of goods and services. It serves as a one-stop solution for various government departments and organizations for their procurement needs.**
- **Initially focused on procuring general store items, GeM has expanded its scope to include a wide range of products and services.**
- It has become a **central hub for government purchases**, bringing together buyers and sellers.

Key Objectives:

- Enhance **transparency, efficiency, and speed in government procurement**
- Provide a **fair and open platform for vendors, including small and medium-sized enterprises (MSMEs).**

Demand Aggregation Module:

- GeM encourages demand aggregation, **wherein ministries pool requirements for similar products.**
- This **promotes large-volume procurement benefits and efficiency in the procurement process.**

Topic 53. APPOINTMENT AND TOR OF 16TH FINANCE COMMISSION***Important for the subject: Polity***

Arvind Panagariya, former Vice Chairman of NITI Aayog appointed as Chairman of the 16th Finance Commission.

- The 16th Finance Commission is tasked to submit its Report by October 31, 2025. Covers a period of five years from April 1, 2026.

Qualification:

- **Qualifications for appointment as, and the manner of selection of, members of the commission.**
- **The Chairman of the Commission shall be selected from among persons who have had experience in public affairs, and the four other members shall be selected from among persons who— are, or have been, or are qualified to be appointed as Judges of a High Court have special knowledge of the finances and accounts of Government have had wide experience in financial matters and in administration have special knowledge of economics.**

Major Terms of Reference for 16th Finance Commission:**Division of Tax Proceeds:**

- **Recommending the distribution of taxes between the Union Government and the States under Chapter I, Part XII of the Constitution.** Includes the allocation of shares among the States from these tax proceeds.

Principles for Grants-in-Aid:

- **Establishing principles governing grants-in-aid to the States from the Consolidated Fund of India.**
- **Determines amounts to be provided to the States as grants-in-aid under Article 275 of the Constitution.**

Enhancing State Funds for Local Bodies:

- **Identifying measures to enhance the Consolidated Fund of a State to supplement resources available to Panchayats and Municipalities.**
- **Based on recommendations made by the State's own Finance Commission.**

Evaluation of Disaster Management Financing:

- **The Commission may review current financing structures related to Disaster Management**

initiatives.

- Examines funds created under the Disaster Management Act, 2005, and presents suitable recommendations for improvements or alterations.

Key Recommendations of 15th Finance Commission:

- Maintained states' share in central taxes at 41% for the 2021-26 period, **a slight reduction from the 42% allocated during 2015-20 by the 14th Finance Commission.**
- **Adjustment accommodates the newly formed union territories of Jammu and Kashmir and Ladakh.**
- **Advised the Centre to limit its fiscal deficit to 4% of GDP by 2025-26.**
- **Proposed a Modernisation Fund for Defence and Internal Security.**
- **Recommendations for Centrally Sponsored Schemes (CSS), including setting a threshold for annual CSS allocations.**

What is the Finance Commission?

- The **Finance Commission is a constitutional body** established under Article 280 of the Indian Constitution.
- Its primary function is to **recommend the distribution of financial resources between the central government and the state governments.**
- The Fifteenth Finance Commission, **made recommendations covering the period of six years commencing on April 1, 2020.**
- Criteria include factors like **income distance, area, population, demographic performance, forest cover, and tax and fiscal efforts.**

Topic 54. AMIT SHAH LAUNCHES PORTAL FOR PROCUREMENT OF PULSES

Important for the subject: Polity

Recently, The Cooperation Minister said that tur farmers can register on the portal to sell their produce to NAFED and NCCF even before the sowing operation.

- The Union Cooperation Minister urged farmers to cultivate pulses on a large scale to reduce dependency on imports.
- The two cooperatives namely the **National Agricultural Cooperative Marketing Federation of India Limited (NAFED) and the National Cooperative Consumers' Federation of India Limited (NCCF)** would procure produce at a minimum support price or the market price.
- **Tur dal procurement portal** was inaugurated to help farmers to register and sell their produce to NAFED and NCCF. A similar facility will be launched in future for urad and

masoor farmers as well as maize farmers.

- The country is dependent on the import of some varieties of pulses **except chana and moong**.

About National Agricultural Cooperative Marketing Federation of India Limited (NAFED):

- National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED) was established in **1958** and is **registered under the Multi State Co-operative Societies Act**.
- Nafed is aimed at promoting **Co-operative marketing of Agricultural Produce to benefit the farmers**.
- The objectives of the NAFED is to **organize, promote and develop marketing, processing and storage of agricultural, horticultural and forest produce, distribution of agricultural machinery, implements and other inputs, undertake inter-state, import and export trade, wholesale or retail**
- As the case may be and to act and assist for **technical advice in agricultural, production for the promotion and the working of its members, partners, associates and cooperative marketing, processing** and supply societies in India.
- **Agricultural farmers are the main members of Nafed**, who have the authority to say in the form of members of the General Body in the working of Nafed.

National Cooperative Consumers' Federation of India Limited (NCCF):

- NCCF was established on **16th October, 1965** to function as the **apex body of consumer cooperatives** in the country.
- The organization aims to **promote consumer cooperative movement** in the country, and 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**. It operates through a network of **24 Branch Offices** located in different parts of the country. NCCF Headquarters is located in **New Delhi**.

About Pulses:

- India is the **largest producer, consumer and importer** of pulse. In India they are typically grown during **Rabi season**.
- **Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and Karnataka** are the top five pulses producing states.

Topic 55. SC DECLINES TO TAKE UP PLEA BY INDIAN HELD IN PRAGUE FOR ‘PLOT’ TO KILL PANNUN

Important for the subject: International Relations

The Supreme Court refused to intervene in a plea by an Indian national for assistance from the Union government to defend his rights in a foreign court after being detained in Prague for alleged involvement in a conspiracy to murder the U.S. based Khalistani activist Gurpatwant Singh Pannun.

Supreme Courts Judgement:

- Judiciary held that Supreme Court could not do anything in a sensitive matter involving public international law, and it was up to the Government of India to decide how to deal with the issue.

About Vienna Convention on Consular Relations, 1963:

- The Vienna Convention on Consular Relations is an **international treaty** that defines a **framework for consular relations between sovereign states**.
- It codifies many **consular practices that originated from state custom and various bilateral agreements between states**.
- The Convention was adopted on 24 April 1963 following the United Nations Conference on Consular Relations in Vienna, Austria.
- The treaty consists of **79 articles**, with the preamble emphasizing the continued application of customary international law to matters not addressed in the Convention.

Some key provisions of the convention:

- **Article 5 outlines thirteen functions of a consul, including protecting the interests of the sending State** and its nationals, assisting nationals, and promoting relations between the sending and receiving States.
- **Article 23 allows the host nation to declare a consular staff member persona non grata at any time**, with the sending state required to recall the individual promptly, or they may lose consular immunity.
- **Article 31 establishes the inviolability of consular premises**, prohibiting the host nation from entering or damaging the premises.
- **Article 35 safeguards freedom of communication between the consul and their home country**, ensuring that consular bags are not opened or detained, and consular couriers are not detained.
- **Article 36 addresses communication between consular officers and nationals of the sending state**, granting consular officers the right to communicate with and visit

nationals who are arrested or detained.

- **Article 37 mandates prompt notification to consular officers** if a sending state's national dies, has a guardian appointed, or if a vessel or aircraft of the sending state is involved in an incident in the receiving state.
- **Article 40 requires the receiving state to treat consular officers** with respect and prevent any attack on their person, freedom, or dignity.
- **Articles 58-68 cover honorary consular officers**, detailing their powers and functions.

Topic 56. INDIAN NAVY THWARTS HIJACKING ATTEMPT IN ARABIAN SEA

Important for the subject: International Relations

Indian warship **INS Chennai** and its **marine commandos** thwarted the attempted hijack of a Liberia-flagged merchant vessel 'Lila Norfolk'.

About Maritime Piracy

- As per the **UN Convention on the Law of the Sea (UNCLOS)**, **maritime piracy is when people on a private boat or ship commit crimes like kidnapping, violence, or robbery for personal gain.**
- **UNCLOS** is an **international treaty which was adopted and signed in 1982** in Montego Bay, Jamaica.
- It lays down a comprehensive regime of law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources. This happens on the open sea and is targeted at another vessel or its people and property.

Various Steps taken by India

Operational steps

- The Indian government has deployed **naval ships with armed helicopters** to patrol the piracy prone areas. The Indian Navy commenced **anti-piracy patrols** in the Gulf of Aden from October 2008.
- In recent years, task Groups comprising destroyers and frigates have been deployed to undertake maritime security operations and render assistance to merchant vessels in case of any incident.
- Also, aerial surveillance by long-range maritime patrol aircraft and Unmanned Aerial Vehicles has been enhanced to have a complete maritime domain awareness. India participates in the various multilateral fora set up to combat piracy.
- The **Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP)** is a government-to-government agreement that aims to

enhance multilateral cooperation among 16 regional countries.

- The **Regional Maritime Security Initiative (RMSI)** is a partnership between regional nations with varying capabilities and capacities.

Institutions created by India

- The Navy's **Information Management and Analysis Centre (IMAC)** and **Information Fusion Centre for Indian Ocean Region (IFC-IOR)** are institutions involved in maintaining maritime security.
- Besides, Indian Navy also coordinates with Coast Guard to maintain enhanced surveillance within the **Exclusive Economic Zone (EEZ)**.

Legislative steps

- India enacted the **Maritime Anti-Piracy Act, 2022** to give effect to arrest and prosecute pirates and strengthen the fight against piracy.
- Also, the government's **SAGAR (Security and Growth For All in the Region) Doctrine** provides a framework for maritime co-operation in the Indian Ocean region.

Djibouti Code of Conduct:

- It is also known as the Code of Conduct concerning the **Repression of Piracy and Armed Robbery** against Ships in the **Western Indian Ocean** and the **Gulf of Aden**. It was adopted on **29th January 2009**.
- It was established under the **International Maritime Organization (IMO)**. Under the code, the signatories agreed to co-operate to the fullest possible extent in the repression of piracy and armed robbery against ships.
- **Jeddah Amendment:** An amendment to DCOC was made in 2017 to cover other illicit maritime activities, including human trafficking and illegal, unreported and unregulated fishing and to build national and regional capacity to address wider maritime security issues, as a basis for sustainable development of the maritime sector.
- **Signatories:** It has been signed by 20 countries including Djibouti, Ethiopia, Kenya, Madagascar, Maldives, Seychelles, Somalia, the United Republic of Tanzania, Yemen, Comoros, Egypt, Eritrea, Jordan, Mauritius, Mozambique, Oman, Saudi Arabia, South Africa, Sudan and the United Arab Emirates.
- The member states are located in areas adjoining the Red Sea, Gulf of Aden and the east coast of Africa and include island nations in the Indian Ocean.
- **Observers:** India, Japan, Norway, the UK and the USA.

Topic 57. HOW HAS RED SEA TROUBLE IMPACTED INDIA?

Important for the subject: International Relations



A spate of attacks on cargo ships in the Red Sea since November by the **Houthi militia of Yemen** has turned the quickest marine route linking Asia with Europe through the Suez Canal unsafe.

- It has forced freighters to take a longer transit around the **Cape of Good Hope** in Africa's southern tip, making shipments both dearer and longer to deliver.

Why Are Attacks Happening?

- Yemen's backed Houthi have been targeting vessels in the **Red Sea** since November to show their **support for the Hamas** in the war against Israel.

Importance of Red Sea Trade Route

- **Historical significance** – red sea has been one of the most important route since ages that connected many civilizations and continents i.e. Asia, Africa, Europe.
- **Economic significance** – **Suez Canal since its inception in 1869** has been the busiest trade route that reduced distance between Europe and Asia by **7000km**.
- **Geopolitical significance** -because of its economic importance and **strategic location (narrow width of Suez Canal)** it has also become geopolitically significant.

How have the Red Sea attacks impacted freight rates?

- Ever since the attacks along the **Bab-el-Mandeb Strait** began earlier this month, global shipping firms have begun imposing war risk surcharges over and above the normal freight rates.
- Indian exporters said that freight rates for Indian shipments headed to Europe and Africa **could surge as much as 25-30 per cent** if the ongoing security concern along the

Red Sea trade route continues.

- This is **troubling, as the European Union is one of India's second-largest export destinations**. Slowing demand from the region has impacted India's labour-intensive sectors, such as textiles, gems and jewellery exports.

Measures Taken by India

- The Indian Navy has substantially **enhanced maritime surveillance** efforts in the central/north Arabian Sea and augmented force levels.
- Task Groups comprising **destroyers and frigates** have been deployed to undertake maritime security operations and render assistance to merchant vessels in case of any incident
- **Aerial surveillance by long-range maritime patrol aircraft** and RPAs remotely piloted aircraft has been enhanced to have complete maritime domain awareness.
- Towards effective surveillance in **economic exclusive zone**, the Indian Navy is operating in close coordination with the Indian Coast Guard.
- The Indian navy is monitoring the overall situation in coordination with national maritime agencies. US Defense Secretary Lloyd Austin announced the creation of **Operation Prosperity Guardian** to protect Red Sea commerce but India is yet to decide on joining it.

Topic 58. SOUTH AFRICA FILES GENOCIDE CASE AGAINST ISRAEL AT ICJ

Important for the subject: International Relations

South Africa has filed a case in the International Court of Justice (the ICJ) against Israel accusing it of 'genocidal acts' and continued bombing in Gaza.

- The Health Ministry in Gaza reported that more than 21,600 Palestinians have lost their lives in Israel's 70% of the total casualties comprises women and children.

Why did South Africa act against Israel?

- **Colonialism:** South Africa, who bore the brunt of colonialism, has traditionally been sympathetic to the Palestinian plight. Like Mahatma Gandhi, Nelson Mandela spoke up strongly for the rights of the Palestinians.

UN's Genocide Convention

- **First treaty:** The UN Genocide Convention is **the first human rights treaty**.

- **Adoption:** It was adopted by the **United Nations General Assembly** on 9 December **1948** **Definition: Genocide** means any acts committed with intent to destroy a national, ethnical, racial or religious group which includes
 - Killing members of the group;
 - Causing serious bodily or mental harm to members of the group;
 - Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part; Imposing measures intended to prevent births within the group;
 - Forcibly transferring children of the group to another group
- **Action:** Any **Contracting Party** may move to the **competent organs of the United Nations** to take action under the Charter of the United Nations.
- **Ratification:** The Genocide Convention has been **ratified or acceded to by 153 States**(as of April 2022)
- **About India:** **India** had participated in the formulation of Genocide Convention and ratified it in August **1959**.
- **International Day:** 9 December is adopted as “**International Day of Commemoration and Dignity of the Victims of the Crime of Genocide and of the Prevention of this Crime**” marks the adoption of the Genocide Convention.

About International Court Of Justice (ICJ)

- **Establishment:** It was established in **1945** by the **United Nations** as one of the six principal organs of the United Nations.
- **Judicial organ:** It is the **principal judicial organ** of the United Nations.
- **Headquarters:** It is headquartered at **Peace Palace, Hague (Netherlands)**.
- **Panel of judges:** **Justice Dalveer Bhandari** is one of the judges of the International Court of Justice.

Topic 59. "PANCHAYAT SE PARLIAMENT TAK"***Important for the subject: Schemes***

The Parliament on Friday hosted a programme named 'Panchayat Se Parliament Tak' for over 500 women representatives of diverse backgrounds from Panchayats and urban local bodies.

- **More on news: 'Panchayat Se Parliament Tak'** is aimed at empowering and supporting women grassroots leaders. Lok Sabha Speaker Om Birla inaugurated the programme in the **Central Hall of Samvidhan Sadan**.
- Reference was made to the **Nari Shakti Vandan Act**, which was passed by the government in the very first session of the new building of Parliament.
- The **Nari Shakti Vandan Act (One Hundred and Sixth Amendment) Act, 2023** is aimed at giving one-third reservation to women in Lok Sabha and State/Union Territory Legislatures to enable greater participation of women as public representatives in policy making at the National and State levels.
- The purpose of this Act is to reserve one-third of the total seats in the Lok Sabha and State Legislatures for women

Panchayat Se Parliament Tak:

- This awareness programme was organized by the **Institute of Constitutional Parliamentary Studies (ICPS)** in coordination with the **National Commission for Women**.
- The initiative is aimed at making panchayats as **agents of change at the village level**. This will help in achieving **self-reliant villages** and in turn accelerated economic development leading to the path of Viksit Bharat.

About Institute of Constitutional and Parliamentary Studies:

- **Institute of Constitutional and Parliamentary Studies** is a premier research institute. It is headed by the **Speaker of Lok Sabha who is ex-officio President of the Institute**.
- The Institute was formally **inaugurated on 10 December 1965 by the then President of India and Chief Patron of the Institute Dr. S. Radhakrishnan** in the Central Hall of Parliament House, New Delhi.
- The Institute was created with the **objective of organizing academic, research and training programmes in the fields of constitutional and parliamentary studies**

Topic 60. SHAH TO TAKE STOCK OF GENERIC DRUG PLAN***Important for the subject: Schemes***

Recently, the Government of India has decided to allow **2000 Primary Agricultural Credit Societies (PACS) to open Pradhan Mantri Bhartiya Jan Aushadhi Kendras** across the country.

About Generic Drugs

- Generic drugs can be defined as **affordable versions of branded drugs** which are brought into the market once the **original drug manufacturer's patent expires**.
- These medicines have the **same potency, quality, and implications and work in an identical manner as the branded drug**. The generic medicines are marketed either by a salt or brand name.

Pradhan Mantri Bhartiya Jan Aushadhi Kendras:

- These are set up under Pradhan Mantri Bhartiya Jan Aushadhi Pariyojana, which was launched by the **Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers in November 2008**.
- **Objective:** To provide quality medicines at **affordable prices for all**, particularly the poor, to **reduce out-of-pocket expenses** in healthcare.
- These Jan Aushadhi Kendras provide generic drugs, which are available at lesser prices but are equivalent in quality and efficacy to expensive branded drugs.
- Jan Aushadhi stores also sell allied medical products commonly sold in chemist shops to improve the viability of running the **Jan Aushadhi store**.
- **Pharmaceutical & Medical Devices Bureau of India (PMBI)** has been established under the Department of Pharmaceuticals, Govt. of India, with the support of all the CPSUs for co-coordinating procurement, supply, and marketing of generic drugs through the PMBKs.
- The incentive amount of **Rs.5 lakh will be provided to set up Pradhan Mantri Bhartiya Jan Aushadhi Kendra**.

Who can open a Jan Aushadhi Kendra?

- **State Governments or any organization / reputed NGOs/ Trusts / Private hospitals / charitable institutions / Doctors / Unemployed pharmacists/ individual entrepreneurs** are eligible to apply for the new Jan Aushadhi Kendra.
- The applicants shall have to employ **one B Pharma / D Pharma degree holder** as Pharmacist in their proposed store.

Topic 61. 10TH CENTURY KADAMBA INSCRIPTION WRITTEN IN KANNADA AND SANSKRIT FOUND IN GOA

Important for the subject: History

An inscription written in Kannada and Sanskrit and said to be of 10th century A.D. Kadamba period has been discovered in the Mahadeva temple at Cacoda in southern Goa.

About Kadamba Dynasty (345-535 C.E.)

- **Founder** – The Kadamba dynasty is believed to have been founded by Mayurasharma, who was originally a feudatory of the Pallavas, a prominent dynasty of South India.
- **Capital** – The early capital of the Kadamba dynasty was Banavasi, located in present-day Karnataka. Later, the capital was shifted to Vijayanti (modern-day Banavasi).
- **Extent** – The Kadamba dynasty was an ancient Indian dynasty that ruled over parts of South India, particularly the present-day Karnataka region, from the **4th to the 6th centuries CE**.
- **End** – The Kadamba kingdom came to an end with **Pulakeshin II**'s capture of Banavasi during the reign of Ajavarman.

Kadambas of Goa

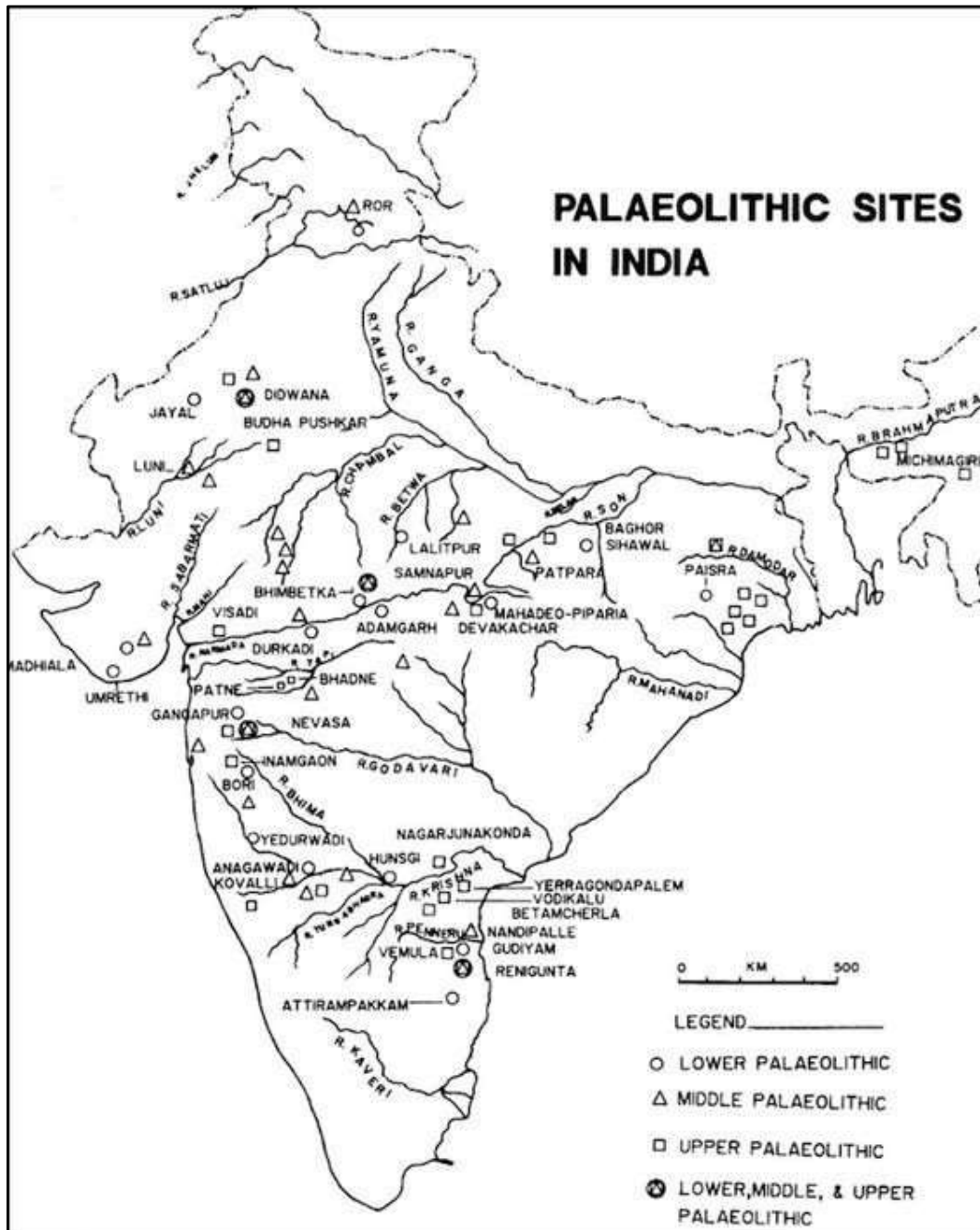
- They were the subordinates of **Chalukyas of Kalyana**. **Chalukyan emperor Tailapa II appointed Kadamba Shasthadeva as mahamandaleshwara** of Goa for his help in overthrowing the Rashtrakutas.
- Kadamba Shasthadeva conquered the city of Chandavara from the Shilaharas in 960 A.D and later, he conquered the port of Gopakapattana (present Goa).
- Gundayya, the son of Talara Nevayya, may have participated in this battle, and won the port at the cost of his life.
- His father may have erected a memorial stone with the inscription in the temple of Mahadev of Cacoda to commemorate the heroic fight of his son.

The Inscription

- The inscription was discovered in the **Mahadeva temple at Cacoda in southern Goa**. It is in the literary style of **Talangre inscription of Jayasimha I** of the same period.
- **Message** – Talara Nevayya's son Gundayya having taken a vow to fulfil his father's desire of capturing a gopura of the port of Goa, fought and died after fulfilling his father's wish. The record is composed as a vocal statement on the death of his son from the mouth of a lamenting father.

Topic 62. DISCOVERY OF PALAEOOLITHIC TOOLS ADDS TO THE UNDERSTANDING OF HUMAN SETTLEMENTS

Important for the subject: History



Recent floods in **Mulugu district, Telangana**. Palaeolithic quartzite tools were found in a dried-up stream post-flood.

Discovery Details:

- Found between **Gurrevula** and **Bhupatipuram** villages in the **Mulugu district**. These were identified based on **chipping style, material, and size**. Stone axe dimensions: 15.5cm x 11cm x

5.5cm.

- Discovered by researcher **Eleswaram Janardanachari**. Belongs to the **Lower Palaeolithic period**, about **3 million years old**. Tools were likely used for woodcutting and hunting by early humans.

Significance:

- Adds to understanding human habitations in **Telangana** and **central India**. The **Chennai discovery** is linked to **early human culture and tools**. The discoveries led to identifying the **Madras Hand-Axe Industry** or **MadrAsian Culture**.

Similar Discoveries:

- Tools similar to those found worldwide from the Palaeolithic era.
- In **1863**, a similar site near **Chennai** revealed tools dating back **1.5 million years**.

Palaeolithic Age:

- Lasted for about **10,000 years**, dating back around **3.3 million years BC**. Divided among- The **Lower Palaeolithic Age**, **Middle Palaeolithic Age** and **Upper Palaeolithic Age**.

Lower Palaeolithic Age (between 600,000 and 150,000 BC):

- The **Lower Palaeolithic** or the **Early Old Stone Age** covers the **greater part of the ice age**.
- It may have begun in **Africa** around **two million years ago**, but in **India**, it is not older than **600,000 years**.
- This date is given to **Bori** in **Maharashtra**, and this site is considered to be the **earliest Lower Palaeolithic site**.

This age consists of two principal tool-making or cultural traditions:

- The **Soanian tradition** forms part of the **East and Southeast Asian chopper chopping tool tradition**.
- The **Handaxe-cleaver** or **biface assemblages** constituting the **Acheulian tradition**, which is widely known from the **western half of the Old World** (Africa, Western Europe, West and South Asia)
- People used **hand axes, cleavers, and choppers**. The axes found in **India** are more or less similar to those of **western Asia, Europe, and Africa**. **Stone tools** were used largely for **chopping, digging, and skinning**.
- **Early Old Stone Age sites** have been found in the **valley of river Son or Sohan** in **Punjab**, now in **Pakistan**. Several sites have been found in **Kashmir** and the **Thar desert**.
- **Lower Palaeolithic tools** have also been found in the **Belan Valley in UP** and the desert area of **Didwana in Rajasthan**.
- **Nagarjunakonda** in **Andhra Pradesh** is an important site, and the caves and rock shelters of **Bhimbetka near Bhopal** also show features of the **Lower Palaeolithic age**. The rock shelters may have served as seasonal camps for human beings.

- The people of the **Lower Stone Age** seem to have principally been food gatherers. They took to small game hunting and lived also on fish and birds.

Middle Paleolithic Age (between 150,000 and 35,000 BC):

- The **Middle Palaeolithic industries** were largely based upon **flakes** or **small pieces of stone** which have been found in different parts of **India** with regional variations.
- This culture consists of a variety of tools made from flakes, and these flakes are produced by specialized techniques. Therefore, it is widely referred to as the **flake tool industry**.
- The artefacts of this age are found at several places on the **river Narmada**, and also at several places, **south of the Tungabhadra river**.
- The **Belan Valley (UP)**, which lies at the **foothills of the Vindhyas**, is rich in stone tools and animal fossils including **cattle** and **deer**. These remains relate to both the **Lower and Middle Stone Ages**.

Upper Paleolithic Age (between 35,000 and 10,000 BC):

- This age, in the world context, marks the **appearance of new flint industries** and **men of the modern type**.
- The **Upper Palaeolithic** is marked by **technological advances in stone tool manufacture** by the **production of parallel-sided blades** which are finished into a variety of tools by blunting one side or by backing.
- In **India**, we notice the **use of blades and burins**, which have been found in **AP, Karnataka, Maharashtra, central MP, southern UP, Jharkhand** and adjoining areas.
- **Caves and rock shelters** for use by human beings in the **Upper Palaeolithic phase** have been discovered at **Bhimbetka**-
- An **Upper Palaeolithic assemblage**, characterized by comparatively **large flakes, blades, burins, and scrapers** has also been found in the **upper levels of the Gujarat sand dunes**.