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Topic 1. SIGNIFICANCE OF Q-DOTS IN NANOTECHNOLOGY

Important for the subject :Science and technology

Alexei I. Ekimov, Louis E. Brus, and Moungi G. Bawendi have been awarded the 2023 Nobel Prize for chemistry “for the discovery and synthesis of quantum dots”.

About Q-dots:

- Quantum dots are **nanoscale particles, typically ranging in size from 1 to 100 nanometers**. These minuscule structures possess **unique properties** that are governed by their **size**.
- The ‘quantum’ in its name comes from the fact that the electrons in these atoms have very little space to move around, so the crystal as a whole displays the quirky effects of quantum mechanics effects that otherwise would be hard to ‘see’ without more sophisticated instruments.
- Quantum dots have also been called ‘artificial atoms’ because the dot as a whole behaves like an atom in some circumstances.

Features of Q-dotes as a nanoparticles

- There are two broad types of materials: atomic and bulk.
- Atomic refers to individual atoms and their specific properties.
- Bulk refers to large assemblies of atoms and molecules.
- Quantum dots lie somewhere in between and behave in ways that **neither atoms nor bulk materials do**.
- One particular behaviour distinguishes them the properties of a quantum dot change based on **how big it is**.
- Just by tweaking its size, scientists can change the quantum dot’s **melting point** or how readily it **participates in a chemical reaction**.
- When light is shined on a quantum dot, it absorbs and then **re emits** it at a different frequency.
- **Smaller dots emit blue light and larger dots, redder light**. This happens because light shone on the dot energizes some electrons to jump from one energy level to a higher one, before jumping back down and releasing the energy at a different frequency.
- So, quantum dots can be easily adapted for a variety of applications including surgical oncology, advanced electronics, and quantum computing.

Q-dots Applications in Nanotechnology

- **Optoelectronics and Displays:** Quantum dots are used in displays and lighting to enhance colour accuracy, brightness, and energy efficiency. QLED (Quantum-dot Light Emitting Diode) technology has led to the developing of high-quality, vivid displays in televisions and monitors.
- **Biological Imaging:** Quantum dots are valuable in biological and medical imaging. They offer bright, stable fluorescence for precise cell and biomolecule tracking in living organisms.
- **Solar Cells:** Quantum dots are studied for use in solar cells to boost efficiency and



broaden the light absorption spectrum.

- **Quantum Dot Lasers:** They are used to develop lasers with low threshold current and tunable emission, which find applications in telecommunications and optical signal processing.
- **Quantum Dot Computing:** Quantum dots may serve as qubits (quantum bits) in quantum computing, advancing the development of robust, efficient quantum computers.
- **Sensors and Detection:** Quantum dots can be used in sensors for substance detection and environmental monitoring due to their sensitivity and tunable traits.
- **Telecommunications:** Quantum dots can amplify and transmit optical signals efficiently.
- **Material Science:** Quantum dots provide insights into nanoscale quantum effects and material behaviour, driving innovation for novel materials and technologies.
- **Energy Storage:** Quantum dots are explored for use in energy storage devices (like batteries and supercapacitors), where their unique properties can enhance energy storage and efficiency.
- **Drug Delivery:** Quantum dots serve as drug delivery carriers in medicine, enabling precise and controlled pharmaceutical release. E.g., cancer treatments.
- **Environmental Remediation:** Quantum dots have applications in environmental remediation, such as removing pollutants from water and soil through photocatalysis.
- **Security and Authentication:** Tunable optical properties of quantum dots enhance their value in anti-counterfeiting measures used in document and product security features.

Topic 2. IMPROVING THE COMPATIBILITY OF PIG ORGANS FOR TRANSPLANTATION

Important for the subject :Science and technology

The design and successful transplantation of kidney grafts from genetically modified pigs into non-human primates has been described in a recent study published in 'Nature' magazine.

What is Xenotransplantation?

- Xenotransplantation, or **transplanting organs across different species**, was first tried in humans in the 1980s.
- The experiment was abandoned after the famous case of the American Baby Fae who was born with a congenital heart defect and received a baboon heart in 1984.
- However, pig heart valves have been used for replacing damaged valves in humans for over 50 years now.
- Nowadays, harvesting organs from genetically engineered pigs is seen as a viable alternative to meet organs shortage.

How the pigs are genetically engineered?

- The donor pig underwent 10 genetic modifications, by which the genes responsible for the rapid rejection of foreign organs by the human body were inactivated or knocked out.
- Four pig genes were removed, and six human genes were added. "GalSafe" pigs, or pigs



that had undergone editing to knock out a gene that codes for Alpha-gal (a sugar molecule) were used.

- Alpha-gal can elicit a devastating immune response in humans. GalSafe pigs have been well studied, and are approved by the US Food and Drug Administration (FDA) for use in pharmacology.

Why pursue xenotransplantation?

- Modern scientific supporters of xenotransplantation argue that the potential benefits to society outweigh the risks, making pursuing xenotransplantation the moral choice.
- None of the major religions object to the use of genetically modified pig organs for life-saving transplantation.

A crucial case in India

- Harvesting organs from genetically engineered pigs is seen as a viable alternative to meet organs shortage.
- According to the health ministry, around 0.18 million people in India are estimated to suffer from renal failure every year, but only about 6,000 renal transplants are carried out in the country.
- About 25,000-30,000 liver transplants are needed annually in India but only about 1,500 are being performed.
- In the case of the heart, 50,000 people suffer from heart failure and are in need of a heart transplant. Yet, only 10-15 heart transplants are carried out in India each year.

Issues with Xenotransplantation

- Besides scientific challenges, there are several ethical challenges to overcome: Animal rights: Many, including animal rights groups, strongly oppose killing animals to harvest their organs for human use.
- Decreased life expectancy: In the 1960s, many organs came from the chimpanzees, and were transferred into people that were deathly ill, and in turn, did not live much longer afterwards.
- Religious violations: Certain animals such as pork are strictly forbidden in Islam and many other religions.
- Informed consent: Autonomy and informed consent are important when considering the future uses of xenotransplantation.
- Threats of zoonosis: The safety of public health is a factor to be considered. We are already battling the biggest zoonotic disease threat.



Topic 3. ISRO PLANS GAGANYAAN UNMANNED FLIGHT TESTS, GEARS FOR ABORT MISSION

Important for the subject: Science and technology



Space technology

The abort mission is expected by October end from the Satish Dhawan Space Centre (SDSC) in Sriharikota.

About Gaganyaan Mission:

- The Gaganyaan project envisages demonstration of human spaceflight capability by launching a crew of three members to an orbit of 400 km for a three day mission and bringing them back safely to earth, by landing in Indian sea waters.
- The first trial (uncrewed flight) for Gaganyaan is being planned by the end of 2023 or early 2024. This will be followed by sending Vyom Mitra, a humanoid and then with the crew on board.

ISRO's first human spaceflight mission:

- This manned mission will be the first of ISRO's human spaceflight missions.
- The US, Russia and China are the only three countries to have conducted human spaceflights yet.

Launched by:

- ISRO's Geosynchronous Satellite Launch Vehicle GSLV Mk III (3 stages heavy-lift vehicle).



Significance of the Gaganyaan mission

- India's aim of Self-reliance: It will help India in achieving self-reliance, in line with the vision of Atma Nirbhar Bharat and also boost the capacity development in launching satellites under the Make in India Initiative.
- It will reduce India's dependence on foreign cooperation in this direction. R&D and robotic programme: It will also enhance the research and development (R&D) at science and technology levels especially in the space sector.
- It is in line with India's progress towards a sustained and affordable human and robotic programme to explore the solar system and beyond.
- Focus on regional needs: Gaganyaan will focus on regional needs because one International Space Station (ISS) may not be enough to cater to global requirements.
- Strengthening international partnerships: The programme will strengthen international partnerships and global security through the sharing of challenging and peaceful goals.

Challenges:

- Environmental Hazards: Hostile space environment with a lack of gravity and atmosphere and danger of radiation.
- Astronauts may have medical issues due to: **Microgravity and Solar insolation.**
- Behavioural issues are likely to crop up when astronauts are confined into small spaces and have to rely on limited resources. They may encounter depression, cabin fever, fatigue, sleep disorder and other psychiatric disorders.
- **Artificial Atmosphere:** There are two choices for an artificial atmosphere, either an Earth-like mixture of oxygen in inert gas or pure oxygen.

Abort Mission for Gaganyaan

- Indian Space Research Organisation (ISRO) will conduct two unmanned '**Abort Mission**' to ensure crew safety during the Gaganyaan mission.
- The abort missions are meant to test the systems that can help the crew escape from the spacecraft mid-flight in case of a failure.
- ISRO already conducted a pad abort test — where the crew can escape from the spacecraft in case of an emergency at the launch pad — in 2018.
- For the abort missions, ISRO has developed test vehicles that can send the systems up to a certain height, simulate failure, and then check the escape system.
- Escape system is designed with five "quick-acting" solid fuel motors with a high burn rate propulsion system, and fins to maintain stability.
- The crew escape system will separate from the crew module by firing explosive nuts.
- ISRO's focus is on perfecting the system that will launch and land Indians on missions to space and to protect the astronauts if the mission fails.

Payloads:

- The payload will consist of:
- **Crew module:** Spacecraft carrying human beings.
- **Service module:** Powered by two liquid propellant engines.
- It will be equipped with emergency escape and emergency mission abort.
- **Launch Vehicle Mark-3 (LVM3/GSLV Mk3) rocket** – heavy lift launcher of ISRO, is identified as the launch vehicle for Gaganyaan mission.



- India's heaviest rocket consists of **3-stage propulsion (solid stage, liquid stage and cryogenic stage)**.
- All systems in the LVM3 launch vehicle are re-configured to meet human rating requirements i.e. **Human Rated LVM3/HLVM3**.
- Under the Gaganyaan schedule (to be launched in 2023):
- Three flights will be sent into orbit.
- There will be **two unmanned flights** and **one human spaceflight**.

Why Abort Mission Before Gaganyaan?

- The abort missions are meant to **test the systems that can help the crew escape from the spacecraft mid-flight in case of a failure**.
- The **Test Vehicle** is a **single-stage liquid rocket** developed for this abort mission that can send the systems up to a certain height, simulate failure, and then check the **escape system**.
- Escape system is designed with **five "quick-acting" solid fuel motors with a high burn rate propulsion system**, and fins to maintain stability.
- The **payloads** consist of the **Crew Module** and **Crew Escape Systems (CES)** with their fast-acting solid motors.
- The crew escape system **will separate from the crew module by firing explosive nuts**.

Topic 4. NOW A MORE EFFICACIOUS, INEXPENSIVE MALARIA VACCINE

Important for the subject :Science and technology

War against malaria gets a shot in the arm

Three countries — Nigeria, Ghana, and Burkina Faso — have already approved the vaccine for children aged less than 36 months

<ul style="list-style-type: none"> ■ A phase-3 trial in 4,800 children was conducted at five sites in four countries with different malaria transmission intensities and seasonality ■ The participants received three vaccine doses four weeks apart, and a booster shot at the end of 12 months after the last dose ■ Primary vaccination was carried out prior to malaria season where it is seasonal or at any time of year in countries where malaria is perennial ■ Vaccine efficacy at the end of one year in children aged 5-36 months was 75% where 	<ul style="list-style-type: none"> ■ malaria is seasonal and 68% when malaria is perennial ■ In children aged 5-17 months, who are more likely to die due to severe malaria, the vaccine efficacy was higher — 79% where malaria is seasonal and 75% where malaria is perennial ■ In children aged 18-36 months, vaccine efficacy was 73% where malaria is seasonal and 63% when malaria is perennial ■ The vaccine efficacy was well maintained to 18 months with a single booster dose given 12 months after the primary series
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Humongous:
In 2021, there were 247 million malaria cases worldwide and 6,19,000 deaths

A malaria vaccine— **R21/MatrixM**— developed by the **University of Oxford**, manufactured by the **Pune-based Serum Institute of India** and tested in a phase-3 trial at five sites in **four countries— Mali, Burkina Faso, Kenya, and Tanzania—**



in **Africa** was recommended (but yet to be prequalified) by the **WHO** on October 2.

About the vaccine:

- The **Matrix-M component** is a proprietary **saponin-based adjuvant** developed by Novavax and licensed to the Serum Institute for use in endemic countries.

What is Adjuvant?

- An adjuvant is an ingredient in a vaccine that enhances the immune system's response to that vaccine.
- Adjuvants help the immune system better recognize what's in a vaccine and remember it longer, increasing the amount of time that a vaccine may offer protection.
- Matrix-M adjuvant is derived from saponins, naturally occurring compounds found in the bark of the Quillaja saponaria tree in Chile. Saponins have a history of medicinal use.
- It is a **new vaccine approved for the prevention of malaria in children**. It is the **first malaria vaccine to reach the WHO's target of 75% efficacy**. It has already been **approved for use in Burkina Faso, Ghana, and Nigeria**.
- The vaccine **will be rolled out in those African countries in early 2024** and will be **available in mid-2024 in other countries**.

What is Malaria?

- It is a life-threatening disease **caused by parasites** that are **transmitted to people through the bites of infected female Anopheles mosquitoes**.
- There are 5 parasite species that cause malaria in humans, and **2 of these species, Plasmodium falciparum and Plasmodium vivax, pose the greatest threat**. Malaria is **common in tropical areas** where it's hot and humid.

Children under 5 years of age are the most vulnerable group affected by malaria.

- It is mostly found in tropical countries. **Four African countries accounted for just over half of all malaria deaths worldwide: Nigeria (31.3%), the Democratic Republic of the Congo (12.6%), United Republic of Tanzania (4.1%) and Niger (3.9%)**.

Elimination Strategies:

India:

- **National Framework for Malaria Elimination (2016-2030)**
- **Malaria Elimination Research Alliance-India (MERA-India)**

Vaccine efficacy of the new malaria vaccine:

- **Three countries- Nigeria, Ghana, and Burkina Faso**— have already approved the use of the vaccine to immunize **children aged less than 36 months**.
- The **vaccine efficacy** at the end of one year in children **aged 5-36 months** was **75%** where **malaria is seasonal** and **68%** where **malaria is perennial**.
- In children **aged 5-17 months**, who are more likely to die due to severe malaria, the **vaccine efficacy was higher** — **79%** where malaria is seasonal and **75%** where



malaria is perennial.

- The higher vaccine efficacy in **younger children** (5-17 months) compared with **older children** (18-36 months).
- The vaccine was **more efficacious** in places where **malaria was seasonal** than when it was **perennial**. The vaccine efficacy is highest 14 days after the third dose and begins to slowly wane.
- The **vaccine efficacy of R21/MatrixM** is **much higher** than the first malaria vaccine — **RTS,S /AS01** that has been recommended by the **WHO** in **2021** — which had a **vaccine efficacy of 56%** at the end of one year in children aged 5-17 months. According to the preprint, even after four booster shots of the RTS,S/AS01 vaccine, the efficacy was only 58% over five years.
- There was “**significantly reduced**” **parasite load** in children who received the vaccine (R21/Matrix-M) that suggests that the **vaccine may help reduce malaria transmission**, especially when combined with other strategies such as mosquito nets.
- The cost of the **R21/Matrix-M** manufactured by **Serum Institute** will be between **\$2** and **\$4** per dose.

Topic 5. CAN THE TONGUE TASTE ONLY SWEET, SALTY, SOUR, BITTER AND UMAMI?

Important for the subject :Science and technology

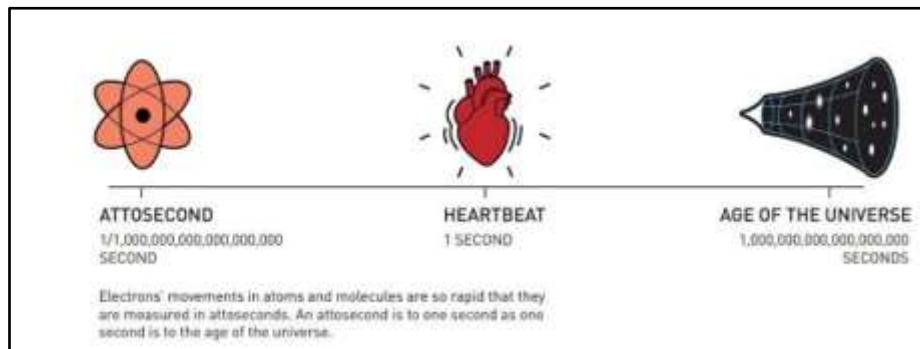
Japanese scientist **Kikunae Ikeda** first proposed **umami** as a **basic taste** — in addition to **sweet, sour, salty and bitter** — in the **early 1900s**. About eight decades later, the **scientific community officially agreed with him**.

Scientists have evidence of a **sixth basic taste**. Researchers have found that the **tongue responds to ammonium chloride** through the same protein receptor that signals **sour taste**.

- Scientists had earlier recognized that the **tongue responds strongly to ammonium chloride** but were unable to specify the **tongue receptors** that respond to it. Recently, they uncovered the **protein responsible for detecting sour taste**.
- That **protein**, called **OTOP1**, sits within **cell membranes** and **forms a channel for hydrogen ions moving into the cell**.
- To confirm this, they turned to a technique that measures **electrical conductivity, simulating how nerves conduct a signal**. They measured how well the **taste cells generated electrical responses called action potentials** when **ammonium chloride is introduced**.
- **Taste bud cells** from wild type mice showed a **sharp increase in action potentials after ammonium chloride was added** while **taste bud cells from the mice lacking OTOP1 failed to respond to the salt**.
- This confirmed their hypothesis that **OTOP1 responds to the salt**, generating an **electrical signal in taste bud cells**.

Topic 6. ATTOPHYSICS — NEW TOOLS TO FATHOM THE WORLD OF ELECTRONS

Important for the subject : Science and technology



On October 3, the **2023 Nobel Prize for physics** was awarded to **Anne L’Huillier, Pierre Agostini, and Ferenc Krausz** “for experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter”.

What is attosecond science?

- **Attosecond science**, including **attosecond physics**, or **attophysics**, deals with the **production of extremely short light pulses** and **using them to study superfast processes**.

Why in news?

- The Nobel Prize in Physics for 2023 has gone to three scientists – **Anne L’Huillier, Pierre Agostini, and Ferenc Krausz**.
- The work of these scientists made it easier to observe electrons and has potential applications in the field of diagnosing diseases and developing electronic gadgets.

Electrons move so fast that it is impossible to observe them in real time.

- These three scientists produced **pulses of light that last only attoseconds**, which is **1×10^{-18} of a second**.
- The **short pulses of light** thus produced can be used to **measure the rapid processes in which electrons move or change energy**.

How do we know a pulse lasts for an attosecond?

- A major technique to measure the **duration of a short light pulse** is called **RABBIT** — and **Pierre Agostini** and his colleagues developed it in **1994**.
- Here, the **attosecond pulse** and **another pulse of a longer duration** are shined on atoms of a noble gas.



- Due to the **photoelectric effect**, the photons in the two pulses kick out electrons from the atoms. Physicists harvest data about these electrons and the atoms. The principles of producing and then measuring attosecond pulses were finally in place.
- In **2001 Agostini et al.**, in Paris, and **Ferenc Krausz et al.** in Vienna were able to produce **verified attosecond pulses** in a ‘train’: a pulse followed by a gap, followed by a pulse, and so forth.
- The **pulse duration** in the former case was **250 as**. In the latter, the **Krausz group** produced a **pulse train** with a **pulse duration** of **650 as**, and using a **filtering technique** was also able to isolate a single pulse, a **bullet of light**. By 2017, experts were able to produce a pulse as short as **43 attoseconds**.
- The current **world record for the shortest light-pulse generated by human technology** is **43 as**.

The main interests of attosecond physics are:

- **Atomic physics:** investigation of electron correlation effects, photo-emission delay and ionization tunneling.
- **Molecular physics and molecular chemistry:** role of electronic motion in molecular excited states (e.g. charge-transfer processes), light-induced photo-fragmentation, and light-induced electron transfer processes.
- **Solid-state physics:** investigation of exciton dynamics in advanced 2D materials, petahertz charge carrier motion in solids, spin dynamics in ferromagnetic materials.
- One of the **primary goals of attosecond science** is to provide advanced insights into the **quantum dynamics of electrons in atoms, molecules and solids** with the long-term challenge of achieving real-time control of the electron motion in matter.

Topic 7. RAIL GAUGE DEBATE

Important for the subject: Science and tech

While the predominant railway network in India is Broad Gauge (BG) with a width of 1.676 meters, the rapid rail transport system in Delhi, the high speed rail line between Mumbai and Ahmedabad, and more than a score of metro rail systems in parts of the country are coming up on Standard Gauge (SG) of 1.435 m width.

What are Railway Gauges?

- The rail gauge of a railroad track is the minimum clear distance measured between the inside faces of the two rails when they are placed in a straight line.
- A standard gauge is **1,435 mm** and is used on about **60% of the railways** in the world.
- In India, there are four different kinds of rail gauges. These include the **Broad gauge, Metre gauge, Narrow gauge, and Standard gauge**.

History of Gauge Debate

- The gauge debate originated in the 1870s when the British introduced the Metre Gauge of **1,000 mm in India**, later transitioning to BG in **1853**.
- In the 1990s, a uni-gauge policy was implemented, leading to the conversion of most



routes to BG.

- However, SG gained traction in the metro rail networks, particularly following a resolution allowing individual State governments to decide on the gauge choice based on recommendations from empowered Ministers.
- E. Sreedharan, then Managing Director of the Delhi Metro Rail Corporation, played a significant role in advocating for SG.
- Despite this, subsequent projects failed to thoroughly analyze the technical and economic aspects of the SG versus BG debate or the advantages of integrating new rail systems with existing networks.

Advantages of SG:

- Proponents of SG argue its universality, citing that many global metro and high-speed rail systems in the last few decades use SG, implying they can function independently without integration with mainline railways.
- However, the reality is more intricate, as several metro rail systems worldwide operate on different gauges.
- Advocates for SG claim it requires less space, both physically on the road and in the aerial structures for elevated portions.
- They also argue for the availability of advanced technology in coach design, assuming it is more prevalent in developed countries.
- However, this argument is countered by India's capacity to design and manufacture its semi-high-speed trains.

Disadvantages of SG:

- While proponents of SG argue for the availability of advanced technology in coach design, assuming it is more prevalent in developed countries, this argument is countered by India's capacity to design and manufacture its semi-high-speed trains.

Advantages of BG:

- The cost argument favors BG, suggesting that despite a slightly higher cost for underground networks, the BG system can offer around 10% lower cost per unit capacity due to the ability to design wider coaches.

Disadvantages of BG:

- Arguments against BG, such as a higher turning radius affecting speed and throughput, are deemed weak.
- The impact of turning radius on commuting time is considered negligible, and throughput is argued to be similar between BG and SG systems.

Conclusion:

- The critical aspect often overlooked is the integration of new rail networks with existing



ones, which carry billions of passengers and millions of tonnes of freight annually.

- Integrating new rail systems with the extensive existing network is seen as advantageous for seamless passenger and cargo movement, improved patronage, and flexibility in emergencies. Considering these factors, it is suggested that the government reassesses the issue and considers adopting BG for all future rail systems.

Topic 8. HOW THE DIGITAL INDIA ACT WILL SHAPE THE FUTURE OF THE COUNTRY'S CYBER LANDSCAPE

Important for the subject: Science and Technology

The **Ministry of Electronics and Information Technology (MEITY)** has introduced the **Digital India Act 2023** to regulate and shape the digital future of the nation.

About the DIA 2023:

- It will replace the **Information Technology Act of 2000**.
- Since 2000 **India's internet user base** has exploded from a mere **5.5 million** to a staggering **850 million**.
- There are the emergence of various **intermediaries** and the **proliferation of new forms of user harm**, such as **cyber stalking, trolling, and doxing**.
- **Primary aim:** To bring **India's regulatory landscape in sync with the digital revolution of the 21st century**.

Key provisions of the Act:

- It places a strong emphasis on **online safety and trust**, with a commitment to **safeguarding citizen's rights** in the **digital realm** while remaining adaptable to shifting market dynamics and international legal principles.
- Recognising the growing importance of **new-age technologies** such as **artificial intelligence and block chain**, the DIA provides **guidelines for their responsible utilization**.
- It aims to not only encourage the adoption of these technologies but also to ensure that their **deployment is in line with ethical and legal principles**.
- It promotes **ethical AI practices, data privacy in block chain applications, and mechanisms for accountability** in the use of these technologies.
- It introduces **mandatory cyber security practices** for entities handling **sensitive data** and sets up mechanisms to respond to cyber threats effectively.
- It upholds the concept of an **open internet**, striking a balance between **accessibility and necessary regulations** to maintain order and protect users.
- **Open Internet** is where consumers and businesses alike have more freedom of action and access to more resources.
- The act seeks to **regulate e-commerce activities**, addressing issues such as **unfair trade practices, counterfeit products, consumer data protection, and dispute resolution**. It aims to **promote transparency, trust, and consumer confidence** in



online transactions.

- Additionally, the **DIA mandates stringent Know Your Customer (KYC) requirements for wearable devices**, accompanied by criminal law sanctions.
- It contemplates a review of the “**safe harbour**” principle, which presently **shields online platforms from liability related to user-generated content**, indicating a potential **shift in online accountability standards**.

Challenges:

Potential impact on innovation and the ease of doing business:

- **Stricter regulations**, particularly in **emerging technologies**, could inadvertently **stifle entrepreneurial initiatives** and **deter foreign investments**.

Criticism of the review of ‘Safe harbour’ principle:

- The review of the “safe harbour” principle, which **shields online platforms from liability for user-generated content**, could lead to a more cautious approach among these platforms, possibly **impinging on freedom of expression**.

Effective enforcement:

- It will require substantial resources, expertise, and infrastructure.
- Balancing the interests of various stakeholders, including tech giants, while ensuring the protection of citizen rights.

Topic 9. LINKS BETWEEN CONSANGUINITY AND GENETIC DISEASES

Important for the subject: Science and technology

Consanguinity, the practice of marrying close relatives, is a widespread tradition still practiced in many human societies, particularly in Asia and West Africa.

An estimated 15-20% of the world’s population practices consanguinity, with India having numerous endogamous groups (people marrying within the same caste or tribe).

What Is Consanguineous Mating?

- Consanguineous mating, often referred to as “incestuous” or “close-kin” mating, involves individuals who share a significant portion of their genetic makeup engaging in sexual relations or marriage.
- These individuals are more closely related than the average couple in a given population. In simple terms, it’s when cousins, siblings, or other close relatives form romantic or sexual partnerships.

Features of Consanguineous Mating

- **Genetic Overlap:** Consanguineous couples share a larger portion of their DNA than unrelated couples. This genetic overlap can lead to an increased likelihood of inherited genetic disorders.
- **Cultural Significance:** In many societies, consanguineous mating is rooted in tradition and cultural values, often seen as a means to strengthen familial ties and preserve social structures.



- **Population Impact:** In regions where consanguineous mating is prevalent, it can have a significant impact on the gene pool, potentially leading to a higher prevalence of certain genetic conditions.

Example of Consanguineous Mating

- **Middle Eastern and North African Cultures:** In a traditional Egyptian family, it is not uncommon for cousins to marry each other. This practice is seen as a way to strengthen family ties and maintain inherited wealth and property within the clan. While there are risks associated with such unions, they remain a deeply ingrained part of Egyptian culture.
- **South Asian Cultures:** In rural parts of Pakistan, it's common for first cousins to marry each other. Families believe that such marriages ensure compatibility and trust between the couple, as they come from the same social and cultural background. Despite growing awareness of the potential genetic risks, the practice persists due to cultural and social pressures.
- **Amish Communities in the United States:** In Amish communities, it's not unusual for second cousins to marry. These communities prioritize preserving their unique cultural and religious heritage, and this practice helps ensure a homogeneous society. However, it can lead to an increased risk of genetic disorders due to the limited genetic diversity.

Risks of Consanguineous Mating

- While consanguineous mating is practiced in many cultures, it is not without risks. Some of the primary concerns associated with this practice include:
- **Increased Risk of Genetic Disorders:** The most significant risk is the higher likelihood of offspring inheriting two copies of a harmful recessive gene, leading to genetic disorders.
- **Limited Genetic Diversity:** Repeated consanguineous mating can reduce genetic diversity within a population, making it more vulnerable to certain diseases and conditions.
- **Social Stigma:** In some societies, consanguineous mating can lead to social ostracism and discrimination.
- **Cultural and Legal Consequences:** In certain regions, consanguineous marriages may be illegal or face societal sanctions.

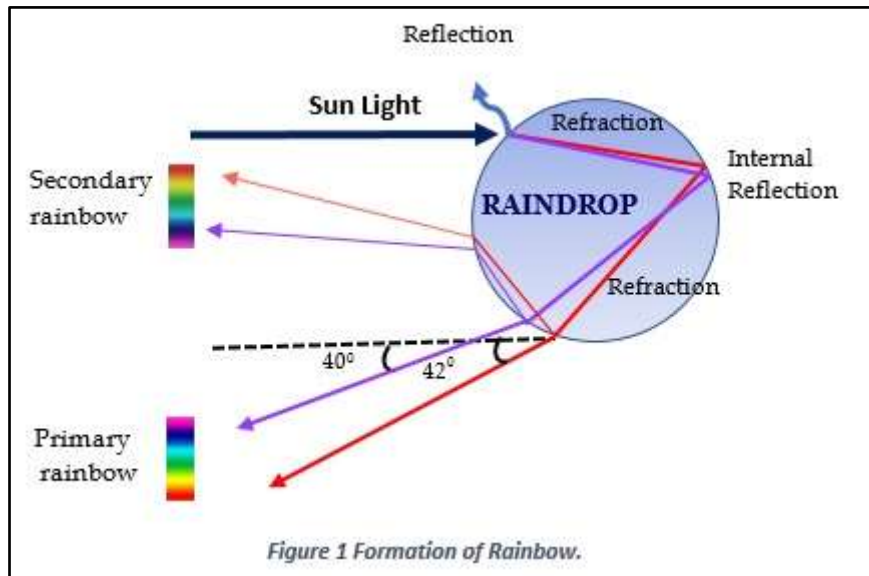
Conclusion

- Consanguineous mating is a complex phenomenon with deep-rooted cultural and genetic implications. Understanding its nature, features, pedigree, and associated risks is essential for informed decision-making and healthcare practices. While it remains a part of various cultures, it is crucial to weigh the potential genetic consequences and make choices that prioritize the well-being of future generations.



Topic 10. WHEN SUN AND RAIN MINGLE

Important for the subject: Science and Technology



Why are rainbows arc shaped?

The cause of rainbow formation is **reflection** and **refraction** of the **sun's rays** as they fall on drops of rain. As a ray passes into a drop of rain, the **water** acts like a tiny **prism**. The ray is bent, or **refracted**, as it enters the drop and is **separated into different colours**.

As it strikes the inner surface of the drop, it is further **refracted** and **dispersed**.

Each colour is formed by rays that reach the eye at a certain angle, and the angle for a particular colour never changes.

- The **higher the sun the lower the bow**. If the sun is **higher than 40°**, no bow can be seen.
- **Raindrops** that lie at this angle and opposite to the sun in the form of a **full circle** or a part of it. Even if there are **enough rain drops to form a circle**, to an observer on the earth it will look like an arc, as it is **limited by the horizon**.
- When the sun is near the horizon, an observer on a high mountain or in a hot-air balloon may see the whole circle of the rainbow.

Primary and secondary rainbow:

- Both the **primary and secondary rainbows** are formed by the **reflection and refraction of sunlight in tiny water droplets**.
- When a sunbeam is being **refracted twice and reflected once** by the droplet, a **primary rainbow will form**. If the beam is being **refracted twice and reflected twice**, a **secondary rainbow will form**.
- The **primary rainbow** forms between about **40° and 42°** from the antisolar point.



The **light path** involves **refraction** and a **single reflection inside the water droplet**.

- The **secondary rainbow** is about **10° further out** from the **antisolar point** than the **primary bow**, is about **twice as wide**, and **has its colors reversed**.
- As the **secondary rainbow** is formed by **one more reflection** than the primary rainbow, it is much **fainter** and rare to see.

Topic 11. INDIA AND SWEDEN TO COLLABORATE ON GREEN STEEL PROJECTS; OTHER NATIONS TO TEAM UP

Important for the subject: Science and Technology

What is green steel?

It is the manufacturing of steel without the use of **fossil fuels**.

“**Green hydrogen**” is one solution that could help reduce the steel industry’s carbon footprint. Green hydrogen is produced by splitting water using electricity generated from solar panels or through wind turbines. When produced using fossil fuels, it is not classified as green hydrogen.

Hydrogen is known to be the cleanest fuel used for powering vehicles as it has zero tailpipe emissions.

Why do we need green steel?

- Traditional steel production is **energy-intensive** and **relies** on the use of coal and other fossil fuels, resulting in significant carbon emissions and other environmental impacts. Green steel, on the other hand, seeks to reduce or eliminate these negative effects through various innovative methods and technologies.

Key elements and strategies involved in green steel production include:

- **Use of Renewable Energy:** One of the most significant aspects of green steel production is the use of renewable energy sources, such as wind, solar, and hydropower, to power steelmaking processes. This reduces the carbon footprint associated with energy consumption in the steel industry.
- **Hydrogen-Based Production:** Green steel can be produced using hydrogen as a reducing agent instead of carbon, which significantly reduces carbon dioxide emissions. This method is known as hydrogen-based direct reduction.
- **Carbon Capture and Storage (CCS):** Green steel production may incorporate CCS technologies to capture and store carbon dioxide emissions produced during the



steelmaking process. This helps mitigate the impact on the environment.

- **Use of Sustainable Raw Materials:** Utilizing recycled steel (scrap) and other sustainable raw materials, as well as reducing the use of iron ore, can make steel production more sustainable.
- **Improved Efficiency:** Implementing energy-efficient technologies and practices in the steelmaking process can reduce energy consumption and emissions.
- **Circular Economy Principles:** Emphasizing recycling and reusing steel products and reducing waste can contribute to green steel production.
- **Environmental Standards and Regulations:** Compliance with environmental regulations and standards, as well as certification processes that verify the sustainability of steel products, is also a part of green steel initiatives.
- The transition to green steel is driven by the desire to reduce the carbon footprint of the steel industry, which is a major contributor to global carbon emissions. This shift is in line with global efforts to combat climate change and promote sustainability.

Topic 12. INDIA NEEDS TO GO NUCLEAR

Important for the subject: Science and Technology





Energy requirement for India:

India's economy is growing rapidly and is expected to **surpass Germany and Japan** and move up **from number five to number three position** before the end of this decade. India's primary energy consumption is the **third-highest globally**. Most of this is based on **fossil energy**.

- To reach a **Human Development Index (HDI)** comparable to advanced countries we need a **minimum of 2,400 kilogram oil equivalent (kgoe) energy consumption per capita per year**.
- The **total clean energy requirement** to support a **developed India** would work out to around **25,000 – 30,000 TWhr/yr**. This is **more than four times** our present energy consumption and corresponds to a **CAGR of around 4.8 per cent**.

Six-pronged national strategy for a rapid scale up of nuclear energy:

Indigenous 700 MWe

- Recently, the **third unit** of the **indigenously developed 700-megawatt electric (MWe) nuclear power reactor** at the **Kakrapar Atomic Power Project (KAPP3)** in **Gujarat** has commenced operations at full capacity.
- **PHWR Fifteen more such units are already under construction in fleet mode.**

Secondly, build indigenous Small Modular Reactors (SMRs).

- **Thirdly, well-proven 220 MWe PHWR units**
- **AHWR300-LEU** developed by **BARC** can also be offered for this role after demonstrating a prototype. **Fourthly, develop a high temperature reactor for direct hydrogen production** without resorting to electrolysis to enable cheaper green hydrogen production.
- Speed up **second and third stage nuclear-power programme development** to unleash **thorium energy potential** in accordance with the pre-existing plans for long-term sustainable energy supply.
- **Finally, emerging-economy countries**, where one expects **maximum net growth in energy consumption**, should see **rapid deployment of new nuclear-energy capacity** to credibly address the **climate-change challenge** at the global level.

Small modular reactors (SMRs):

- These are advanced nuclear reactors that have a **power capacity of up to 300 MW(e) per unit**, which is about **one-third of the generating capacity of traditional nuclear power reactors**. SMRs, which can **produce a large amount of low-carbon electricity**, are:
- **Small** – physically a fraction of the size of a conventional nuclear power reactor.
- **Modular** – making it possible for systems and components to be factory-assembled and transported as a unit to a location for installation.
- **Reactors** – harnessing nuclear fission to generate heat to produce energy.

CANDU Reactors:



- The **CANDU (Canada Deuterium Uranium)** is a **Canadian pressurized heavy-water reactor** design used to generate electric power.
- The acronym refers to its **deuterium oxide (heavy water) moderator** and its use of (originally, natural) **uranium fuel**. **CANDU reactors** were first developed in the late **1950s and 1960s** by a partnership between **Atomic Energy of Canada Limited (AECL)**, the **Hydro-Electric Power Commission of Ontario, Canadian General Electric**, and other companies.
- By 2010, **CANDU-based reactors** were operational at the following sites of India: **Kaiga (3), Kakrapar (2), Madras (2), Narora (2), Rajasthan (6), and Tarapur (2)**.

Pressurized heavy Water Reactor (PHWR):

- A **pressurized heavy-water reactor (PHWR)** is a **nuclear reactor** that uses **heavy water (deuterium oxide D2O)** as its **coolant and neutron moderator**. **PHWRs** frequently use **natural uranium as fuel**, but sometimes also use **very low enriched uranium**.
- The **high cost of the heavy water** is offset by the **lowered cost of using natural uranium** and/or alternative fuel cycles.
- As of the beginning of **2001, 31 PHWRs** were in operation, having a total capacity of **16.5 GW(e)**, representing roughly **7.76%** by number and **4.7%** by generating capacity of all current operating reactors.

Thorium- HALEU fuel:

- The National laboratory is testing **thorium** and **high-assay low-enriched uranium (HALEU)** developed by **Clean Core Thorium Energy** for use in **pressurized heavy water reactors (PHWRs)**.

Clean Core Thorium Energy:

- A **Chicago-based** company, **Clean Core** was founded in **2017**. Investing nearly a decade **exploring thorium driven power**, our founders envisioned a revolutionary solution to nuclear's safety, waste, and proliferation concerns.

Developed by Clean Core:

- **Thorium- HALEU fuel ANEEL Fuel: Advanced Nuclear Energy for Enriched Life-** developed for use in **pressurized heavy water and Candu reactors**.

Benefits of ANEEL fuel:

- **Cost:** By achieving greater output within existing safety margins, **ANEEL Fuel substantially reduces operating costs of existing reactors**
- **Size:** Through optimization for use in existing small modular reactors, **ANEEL Fuel** offers an ideal fit for emerging nations equipped with small grid sizes
- **Waste:** Through high burnup fuel performance, **ANEEL Fuel** reduces nuclear waste generation by **87.5%** and reduces waste storage volume
- **Proliferation:** By ensuring proliferation resistance using thorium in **ANEEL Fuel**, nuclear capacity can be deployed to nations that were previously unaddressable



Topic 13. GOVERNMENT MULLS PARTNERSHIPS TO MAKE SEMICONDUCTOR CHIPS

Important for the subject: Science and Technology

Six working groups, which had been formed to mull the Indian government's **artificial intelligence (AI) roadmap**, have submitted the **first edition** of their report adding that the report's recommendations included **public-private partnerships** to make **semiconductors for AI applications**.

- The **PPP model** would be leveraged to build "**GPU clusters**", masses of resource-intensive graphics processors that are used by AI applications.
- These clusters would be made available to **Indian start-ups and researchers**.
- **Use cases for AI:** agriculture, healthcare, education, fintech, security, and governance.

India Dataset Platform:

- A planned collection which will be among the largest and most diverse collections of anonymised datasets for Indian researchers and startups to train their multi-parameter models.

Significance of semiconductor for AI development:

- Semiconductors Are Essential For AI In Providing the Required Processing Power.
- Advanced semiconductor materials provide the performance and power efficiency needed for AI applications.
- Semiconductor design is critical to **AI chips' performance and efficiency**. As AI algorithms become more **complex**, semiconductor designers will need to develop new ways to optimize the performance of AI chips.

INDIAai portal- National AI portal of India:

- **INDIAai** is the **National AI Portal of India** – a central hub for everything AI in India and beyond.
- A joint initiative of **MeitY, NeGD and NASSCOM**, the website aims to be the trusted content powerhouse in the backdrop of India's journey to global prominence in Artificial Intelligence.

US-India AI Initiative:

- In 2023, **US-India Artificial Intelligence** was launched by **IUSSTF** to build a strong platform for promoting the growth of AI through idea exchange, exploring R&D opportunities, and strengthening the collaboration prospects between the two countries.

MCA 3.0 portal:



- The **Ministry of Corporate Affairs** introduced a **modern and agile version of its portal- version 3.0, MCA 21**.
- It is designed to take the **complexity out of regulatory filing for companies with the help of AI/ML and advanced data analytics capabilities** for automating and streamlining the processes.
- Along with improving **ease of doing business** this initiative will also strengthen compliance monitoring and help create a well-organized ecosystem for businesses.
- It will provide a robust **tracking mechanism** for monitoring historical law changes while also providing quick access to most current legislations. Overall it will help in bringing transformative changes to incorporate regulatory and governance systems.

AI portal:

- A joint venture of **MeitY** and **NASSCOM**, the **AI portal** is a dedicated central ecosystem encompassing information, resources, and the latest updates about different initiatives and developments in the field of AI in India.
- It has been thoughtfully designed to invite people of different backgrounds and educational qualifications to be a part of the AI community.

Draft National Strategy on Robotics:

- **Released by:** Union Minister of State for Skill Development & Entrepreneurship and Electronics & IT Shri Rajeev Chandrasekhar.
- It represents the significant opportunities for the manufacturing sector, Industry 4.0 and cyber-physical systems among others, it has the potential to create a lot of impact.
- It **aims** to capitalize this potential and nurture the development of robotic technology, helping India emerge as a **“Robotics Hub”** for the world.
- To drive India’s global leadership in Robotics, four sectors of strategic importance have also been identified, namely – manufacturing, agriculture, healthcare and national security.
- The draft strategy recommends fiscal interventions to facilitate local manufacturing of robotics hardware, building of ‘demonstration facilities’ to test and show off technologies, and building capacity in the robotics sector.

Topic 14. THE AFTERGLOW OF AN EXPLOSIVE COLLISION BETWEEN GIANT PLANETS MAY HAVE BEEN DETECTED IN A FAR-OFF STAR SYSTEM

Important for the subject: Science and Technology

The afterglow of a **massive collision** between two giant planets may have been detected for the first time.

The wreckage of the collision could eventually cool and form an **entirely new planet**.

If the observation is confirmed, it provides an amazing opportunity to **watch the birth of a new world in real time** and **open a window into how planets form**.

Observations:

- To emit the amount of energy observed, the post-impact body must have been many **hundreds of times the size of Earth** as large as the “ice giant” planets **Uranus** and **Neptune**.



- The **temperature of the post-impact body** is around **700°C**. For the temperature to be that low, the colliding bodies could not have been entirely made of rock and metal.

About the star- Aaan-21qj:

- In December 2021, astronomers observed a **star** and at times it would almost disappear, before returning to its previous brightness.
- The **star**, which sits roughly **1,800 light years** from **Earth**, was given the identifier **ASASSN-21qj**, after the **ASASN-SN astronomy survey** that first observed the **star's dimming**.
- The dimming of stars is generally attributed to material passing between the star and Earth. **Infrared light** is most strongly emitted by objects at relatively **high temperatures** of a few hundred degrees Celsius.
- The **infrared brightening of ASASSN-21qj** was observed by **NASA's WISE space telescope**. **WISE** only looks at the star every **300 days** or so and probably missed the initial flash of light from the impact.

Planetary cataclysm:

- Both sets of observations could be explained by a **cataclysmic collision** between two planets.
- **Giant impacts and collisions** are common in the **final stages of the formation of planets**. They dictate the **final sizes, compositions and thermal states of planets** and **mould the orbits of objects** in those planetary systems.
- In our solar system, **giant impacts** are responsible for the **odd tilt of Uranus**, the **high density of Mercury** and the **existence of Earth's Moon**.
- But, until now, we had little direct evidence of giant impacts ongoing in the galaxy.
- A collision would have needed to **release more energy in the first few hours after impact** than would be emitted from the star. **Material from the colliding bodies would have been superheated and melted, vaporized or both**.

New planet or the post-impact body:

- The impact would have formed a **hot, glowing mass of material** hundreds of times larger than the original planets.
- However, the **expanded planetary body** produced by the **impact will take a long time, perhaps millions of years, to cool and shrink** to something we might recognise as a **new planet**.
- Initially, when this "**post-impact body**" was at its greatest extent, it could have produced the **infrared brightening**.
- The impact would also have **ejected great plumes of debris** into a range of different orbits around the star. A fraction of this debris would have been vaporized by the shock of the impact, later condensing to form clouds of tiny ice and rock crystals.
- Over time, some of this clumpy cloud of material passed between **ASASSN-21qj** and **Earth**, blocking out a fraction of the visible light from the star and producing the erratic dimming.



Ice giants:

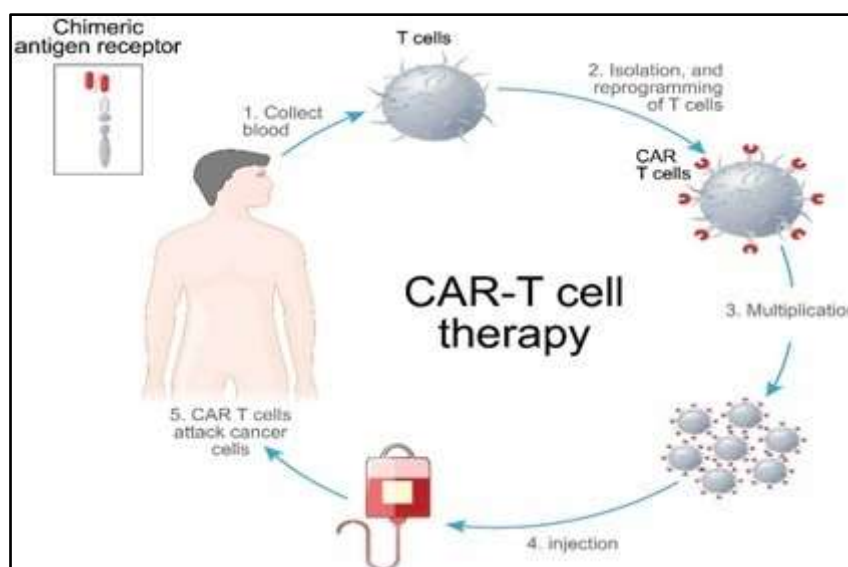
- The outer regions of at least one of the planets must have contained elements with low boiling temperatures, such as in water. It is like a collision between **two Neptune-like worlds** that are rich in ice.
- The delay between the **emission of infrared light** and the **observation of debris crossing the star** suggests that the collision took place quite far away from the star.

WISE telescope:

- **Wide-field Infrared Survey Explorer (WISE)** is a **NASA infrared astronomy space telescope** in the **Explorers Program**.
- It was launched in **December 2009** and placed in hibernation mode in February 2011, before being **re-activated** in 2013 and renamed the **Near-Earth Object Wide-field Infrared Survey Explorer (NEOWISE)**.
- **WISE** discovered thousands of minor planets and numerous star clusters. Its observations also supported the discovery of the **first Y-type brown dwarf and Earth trojan asteroid**.
- After its solid hydrogen coolant depleted, a four-month mission extension called **NEOWISE** was conducted to search for **near-Earth objects (NEO)** such as **comets and asteroids** using its remaining capability.

Topic 15. IMMUNOACT'S CELL THERAPY TO TREAT BLOOD CANCER GETS CDSCO NOD

Important for the subject: Science and Technology



IIT Bombay-incubated Immunoadoptive Cell Therapy (ImmunoACT), in which drugmaker Laurus Labs holds about 34% stake, has received Central Drugs Standard Control Organisation's (CDSCO) marketing authorisation **approval** of the 'first' humanised CD19-targeted Chimeric Antigen Receptor T cell (CAR-T cell) therapy product for



relapsed/refractory **B-cell lymphomas and leukaemia (blood cancer)** in India.

India's home grown CAR-T cell therapy, a form of immunotherapy, gets market authorisation

DEATAILS:

- For treating relapsed-refractory **B-cell lymphoma and leukemia**, Mumbai-based Immunoadoptive Cell Therapy Private Limited (Immuno ACT) announced the approval of **India's first chimeric antigen receptor (CAR) T-cell therapy** by the Central Drugs Standard Control Organization (CDSCO) on October 13, 2023.
- Called **NexCAR19**, it is an indigenously developed **CD19-targeted CAR-T cell therapy**.
- **CD-19 is biomarker for B lymphocytes** and can be utilised as a target for leukemia immunotherapies.
- **ImmunoACT** is an IIT Bombay-incubated company founded in 2018 and works on converting research into pharmaceutical products
- It is a major breakthrough as the therapy is not available in India outside of clinical trials. The multi-centre Phase I and II clinical trials were conducted with 60 patients with r / r B-cell lymphomas and leukemia. The clinical data indicated a 70 per cent overall response rate.
- Immuno ACT received market authorisation for our CAR-T cell therapy from the Drugs Controller General of India .
- CAR T-cell therapy is generally accompanied by some side effects. One of them, according to the American Cancer Society, is cytokine release syndrome (CRS). It is when CAR T-cells multiply, they can release large amounts of chemicals called cytokines into the blood, which can ramp up the immune system.
- In comparison to other CAR T-cell therapies, the safety profile of CRS and the absence of neurotoxicity indicates a significant improvement.
- Priorly, CAR-T cell therapy cost around \$400,000 or over Rs 3.3 crore and patients could avail of it in the United States. With this development, the therapy will be accessible at 20 Indian government and private hospitals treating cancer across major cities at around Rs 30-35 lakh per patient.

About CAR-T Cell Therapy

- CAR-T cell therapy stands for **chimeric antigen receptor T cell therapy**.
- It is a type of **cancer immunotherapy** that uses the **patient's own T cells, genetically modified** in a laboratory to enhance their ability to locate and destroy cancer cells.

Working Process

- T cells are **white blood cells** responsible for identifying and fighting illness and infection. Each T cell has a receptor that can **recognize antigens** (proteins or molecules recognized by the immune system).
- Cancer cells may have antigens that the immune system does not recognize as abnormal, allowing cancer to evade the immune response.



- CAR-T cells are genetically engineered in the lab to express a new receptor that can **bind to cancer cells and effectively kill them.**

The process involves several steps, including:

- **Collecting T Cells: Blood is drawn** from the patient's arm, and T cells are separated from the blood using an apheresis machine.
- **Engineering T Cells:** In a laboratory, the **T cells are modified** by adding a manufactured CAR, and they are allowed to multiply and grow.
- **Infusing CAR-T Cells:** Once enough CAR-T cells are prepared, they are **injected back into the patient's arm.**
- Chemotherapy may be recommended before **CAR-T cell infusion** to enhance treatment effectiveness.
- The process can take place in an **outpatient infusion center** or a hospital setting.

Cancers Treated:

- CAR-T cell therapy is effective against **certain types of cancer**, especially when other treatments are ineffective.
- It is currently FDA-approved for treating **haematological malignancies**, including **leukemia, lymphoma, and multiple myeloma.**

Topic 16. THIS IS THE LARGEST MAP OF THE HUMAN BRAIN EVER MADE

Important for the subject: Science and Technology

Researchers have created the **largest atlas of human brain cells** so far, revealing **more than 3,000 cell types** — many of which are new to science.

About the human brain atlas:

- It offers a detailed snapshot of the most complex known organ. It will aid the study of diseases, cognition and what makes us human, among other things.
- Researchers have previously **mapped the human brain** using techniques such as **magnetic resonance imaging**, but this is the **first atlas of the whole human brain at the single-cell level**, showing its intricate molecular interactions.
- Researchers have **sequenced the RNA of more than 3 million individual cells** from **106 locations** covering the **entire human brain**, using tissue samples from three deceased male donors.
- Their analysis documented **461 broad categories of brain cells** that included more than **3,000 subtypes.**
- The researchers uncovered **links between certain brain cell types and neuropsychiatric disorders**, including bipolar disorder, depression and schizophrenia.

About the research:

- The research is part of the **US National Institutes of Health's Brain Research through Advancing Innovative Neurotechnologies Initiative — Cell Census**



Network (BICCN), a collaboration between hundreds of scientists.

- The programme’s goals include **cataloguing brain cell types across humans, non-human primates and mice** to improve understanding of the cellular mechanisms behind poorly understood brain disorders.
- The data from the **21 studies** have been made publicly available on the Neuroscience Multi-omic Archive online repository.

Brain cells:

- **Neurons** — cells in the brain and nervous system that send and receive signals — varied widely in different parts of the **brain**, suggesting different functions and developmental histories. The **mix of neurons** and **other cell types** also differed across each region; some cells were only found in specific locations.
- The **brainstem** — a relatively under-studied structure connecting the brain to the spinal cord — harbored a particularly high number of neuron types.

Gene switch:

- Even the **same gene in the same type of cell** could have **different characteristics across the brain**.
- Pinpointing the switches that activate or block gene expression in brain cells could be useful for diagnosing brain disorders and developing tailored treatments.
- Improving understanding of how genetic switches might contribute to disease risk.
- Researchers used the **cell-type data** to **predict how the genetic switches influence gene regulation** and **increase the risk of neurological diseases**.
- In cells called **microglia**, which clear away dead or damaged cells, the **presence of some genetic switches** was strongly linked to risks of **Alzheimer’s disease**.
- Such findings can be used to test whether particular genes or faulty switches contribute directly to the onset of disease.

Topic 17. EGYPT IS RACING TO ELIMINATE HEPATITIS C

Important for the subject: Science and Technology

WHO announced that **Egypt** had made “**unprecedented progress**” towards **eliminating hepatitis C**. According to the WHO, **Egypt** became the **first country** to achieve “**gold tier**” **status** on the path to elimination of **hepatitis C** as per the global health body criteria.

Egypt has diagnosed **87% of people living with hepatitis C** and has provided **93%** of those diagnosed with curative treatment, exceeding the **WHO gold tier targets** of diagnosing at least **80%** of people living with **hepatitis C** and providing treatment to at least **70%** of diagnosed people.

“100 Million Healthy Lives” initiative:

- Launched by **Egypt**.

Key interventions under the initiative:

- Egypt significantly reduced the prevalence of **hepatitis C** from **10% in 2016** to **5% in 2018** and an estimated **less than 1% in 2019**. Population-based surveys to understand the



hepatitis C epidemic (who is affected and where).

- Development of an investment case to highlight the economic burden of HCV. **One third of the 12 million people living with hepatitis C** are living in the Eastern Mediterranean Region.
- **Egypt** also customized the **elimination programme** by involving **generalist doctors to community healthcare workers** and **using telemedicine for hard-to-reach areas**.
- The biggest boost came from **reducing the cost of medical treatment per patient to less than \$50** through local manufacturing.

Criteria for “gold tier” status:

- The “**gold tier**” status to reach the stated goal of eliminating **hepatitis C** includes **meeting specific criteria** such as **ensuring 100% blood and injection safety, maintaining a minimum of 150 needles/syringes per year** for people who inject drugs (PWID), **diagnosis of over 80% of people living with chronic hepatitis C virus (HCV), treating of over 70% of individuals diagnosed with HCV**, and the **establishing of a sentinel surveillance programme for hepatitis sequelae**, including liver cancer.

Hepatitis C:

- **Hepatitis C** is an **inflammation of the liver** caused by the **hepatitis C virus**. The virus can cause both **acute and chronic hepatitis**, ranging in severity from a mild illness to a serious, lifelong illness including liver cirrhosis and cancer.
- The **hepatitis C virus** is a **bloodborne virus** and most infections occur through **exposure to blood from unsafe injection practices, unsafe health care, unscreened blood transfusions, injection drug use and sexual practices** that lead to exposure to blood.
- **Hepatitis C infection** is unevenly distributed globally, with these regions accounting for the most — **European (22%), South-East Asia (20%) and the Eastern Mediterranean (17%)**.
- According to a **2023 WHO document**, in 2019, there were **1.5 million new infections**, with **one third of new HCV infections** occurring in the **Eastern Mediterranean Region**. The prevalence of **hepatitis C** across the world in 2019 was **58 million**.
- **Direct-acting antiviral medicines (DAAs)** can cure more than **95%** of persons with **hepatitis C infection**, but access to diagnosis and treatment is low. There is currently **no effective vaccine** against hepatitis C.

Topic 18. 19 DOLPHINS RESCUED ALIVE FROM CANALS OF GANGA-GHAGRA BASIN, SAYS STUDY

Important for the subject : Environment

A recent publication by scientists and researchers has revealed that **19 Gangetic river dolphins** had been rescued from the **irrigation canals of the Ganga-Ghagra basin** in **Uttar Pradesh** between **2013 and 2020**.

Titled ‘**Rescuing Ganges river dolphins (Platanista gangetica) from irrigation canals in Uttar Pradesh, North India, 2013–2020**’.

The publication details about:



- Highlights the capture and relocation methods
- Describes the behavioral and demographic details of rescued animals and locations of these canals where the animals had been trapped.

Key findings:

- **24 rescue operations** had been conducted from **2013 to 2020** (**19** successful rescue operations) and **five dolphins had died**.
- **Dams and barrages** had severely affected this **habitat** as dolphins moved into irrigation canals where they were at a **risk of injury or death from multiple factors**, such as **rapidly receding waters, heat stroke and human interferences**.
- The dolphins may either **stray into the canal** while following prey upstream or **get flushed into the canal** by a sudden discharge of water from the barrage gates.
- Over **70%** of entrapments were reported either post monsoon or during peak winter.

Global efforts to protect dolphins:

- In **2016**, the **International Whaling Commission's (IWC) scientific committee** recognised that both **Ganges and Indus river dolphins** require prompt and coordinated action to protect them from imminent threats.
- In **2017**, the **IWC** created the **Asian River Dolphin Task Team (AR-TT)** to identify information gaps and research priorities and develop concerted action for the protection of the **Ganges and Indus river species** in their range.

Gangetic dolphins:

- The **Ganges river dolphin** can **only live in freshwater** and is **essentially blind**. They **hunt by emitting ultrasonic sounds** or by **echolocation**.
- They are frequently found alone or in small groups, and generally a mother and calf travel together. Females are larger than males and give birth once every two to three years to only one calf.
- Gangetic dolphins are the **national aquatic animal of India**.
- **National Board for Wildlife (NBWL)** has accorded the **5th October** as **National Dolphin Day** in **2022**.

The Ganges river dolphin is in:

- **Schedule 1 of the Indian Wildlife (Protection) Act 1972**, Endangered in **IUCN Red list**.
- **Appendix 1 of the Convention on International Trade in Endangered Species (CITES)** and **Appendix 1 of the Convention on Migratory Species (CMS)**.

International Whaling Commission (IWC):

- Formation: **2 December 1946**
- Headquarters: **Impington, United Kingdom**
- Membership (2020): **88 nations**
- The **International Whaling Commission (IWC)** is a **specialized regional fishery management organisation**, established under the terms of the **1946 International**



Convention for the Regulation of Whaling (ICRW) to “provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry”.

- Through the “**Florianópolis Declaration**” of **2018**, members of the organization concluded that the purpose of the **IWC** is the conservation of whales and that they would now safeguard the marine mammals in perpetuity and would allow the recovery of all whale populations to pre-industrial whaling levels.
- In response, **Japan announced on 26 December 2018**, that since the **IWC failed its duty to promote sustainable hunting, which is one of its stated goals, Japan is withdrawing its membership and will resume commercial hunting in its territorial waters and exclusive economic zone from July 2019**, but will cease whaling activities in the Southern Hemisphere.

Turtle Survival Alliance Foundation India:

- Formed in **2001** and gaining nonprofit status in **2004**, **Turtle Survival Alliance** is a **global conservation organization** that works to create a planet where tortoises and freshwater turtles can thrive in the wild.
- These science-based initiatives are directed by **local leaders, inspiring sustainable, community-based stewardship to prevent extinctions.**
- Where populations cannot yet thrive in the wild, our captive breeding programs preserve opportunities for their future survival.

Ghaghra river:

- The **Ghaghara River**, called **Karnali River** in **Nepal**, **Mapcha Tsangpo** in **Tibet**, and the **lower Ghaghara** in **Awadh** called **Sarayu River**, is a **perennial trans-boundary river that originates in the northern slopes of the Himalayas in the Tibetan Plateau**, cuts through the Himalayas in Nepal and **joins the Sharda River at Brahmaghat in India.**
- Together they form the **Ghaghara River**, a major **left bank tributary of the Ganges.** With a length of **507 km (315 mi)** it is the **longest river in Nepal.**
- The total length of Ghaghara River up to its confluence with the Ganges at Revelganj in Bihar is **1,080 km (670 mi).**
- It is the **largest tributary of the Ganges by volume** and the **second largest by length after Yamuna.**

Tributaries:

- **Left:** Bheri, Kuwana, Rapti, Chhoti Gandak
- **Right:** Seti, Dahawar, Sarada, Budhi Ganga



Topic 19. PREY, HABITAT DICTATE ASIATIC WILD DOG-TIGER COEXISTENCE, SAYS STUDY

Important for the subject: Environment



Overlapping prey availability or habitat suitability could dictate a positive association between **dholes** and **tigers**, facilitating **co-existence or even cooperative behaviours** between the two species of carnivores, a new study has found.

Details about the study:

- Study conducted in: Western Assam's **Manas National Park**
- **Study title:** 'Do dholes segregate themselves from their sympatrids? Habitat use and carnivore co-existence in the tropical forest'
- **Sympatric** refers to animals, plant species, and populations within the same or overlapping geographical areas.

Findings:

- The **diurnal activity** of the **dholes** had the **highest temporal overlap** with **leopards** and the **lowest** with **clouded leopards**.
- The **global population of adult dholes** is estimated to be between **949 and 2,215 individuals**, scattered in localized areas of **India and Thailand**.
- The findings revealed a surprising **positive relationship between dhole habitat use and tiger**, rejecting the **habitat exclusivity hypothesis**.
- The **positive association** could be attributed to factors such as **overlapping prey availability or habitat suitability**, which may facilitate co-existence or even cooperative behaviors between dholes and tigers.

About Dhole (Asiatic wild dog):

- The **dhole or Asiatic wild dog** (*Cuon alpinus*) is the **only endangered wild pack-living canid** in the **tropical Indian forests** and is considered at **high risk of extinction**.
- They are native to **Central, South, East and Southeast Asia**. Dholes were once widespread across **southern and eastern Asia**.
- During the **Pleistocene**, the **dhole** ranged throughout **Asia, Europe and North**



America but became restricted to its historical range 12,000–18,000 years ago.

- Other English names for the species include Asian wild dog, Asiatic wild dog, Indian wild dog, whistling dog, red dog, red wolf, and mountain wolf.
- The dhole is a **highly social animal**. It is a **diurnal pack hunter** which preferentially targets large and medium-sized ungulates.
- In tropical forests, the dhole competes with the tiger (*Panthera tigris*) and the leopard (*Panthera pardus*), targeting somewhat different prey species, but still with substantial dietary overlap.

IUCN Red list: Endangered

- **Factors** such as habitat loss, declining prey availability, persecution, disease, and interspecific competition have contributed to the ongoing fragmentation of its populations.

Dhole range

Topic 20. PHONOTAXIS: FIRST SOUND THEN MOTION

Important for the subject: Environment

What is Phonotaxis?

Phonotaxis is the movement by an animal in response to a sound. It has mostly been observed among **crickets, moths, frogs, toads, and a few other creatures**.

There are **two types of phonotaxis: positive and negative**.

Positive phonotaxis:

- The purpose of **positive phonotaxis** is **attraction**.
- It usually happens when the females of a particular species are attracted to the sounds made by the males.

Negative phonotaxis

- It serves to **repel or warn**, such as when the sound of a predator nearby signals to an animal that it needs to move away.
- In **1984**, scientists found that **Mediterranean house geckos** (*Hemidactylus turcicus*) use **positive phonotaxis** to their advantage. The fields that these geckos inhabited were also home to **male decorated crickets** (*Gryllodessuppicans*), which used **species-specific sounds** to attract the females from their burrows. The geckos recognised and followed this call until they reached the burrow, where they consumed the female crickets.



Topic 21. BOOK ON ENDEMIC BIRDS SAYS THREE SPECIES ALMOST EXTINCT

Important for the subject: Environment

A new book, **75 Endemic Birds of India**, was launched by the **Zoological Survey of India (ZSI)**. Authored by **Dhriti Banerjee, Amitava Majumder** and **Anindya Naskar**, the book commemorates **75 years of Indian independence**.

About the book:

- The book contains **details**, including the **etymology of bird names** and their **historical relevance** along with vital facts such as subspecies differences, distinguishing traits, preferred habitats, breeding habits and food preferences.

The book also comes with maps indicating species distribution.

- The book outlines the **endemicity of Western Ghats** which is home to species such as **Malabar grey hornbill** (*Ocyroceros griseus*), **Malabar parakeet** (*Psittaculacolumboides*), **Ashambu laughingthrush** (*Montecinclameridionalis*), **white-bellied sholakili** (*Sholicolaalbiventris*), **Nilgiri pipit** (*Anthusnilghiriensis*) and more.
- Some birds **endemic to the Andaman and Nicobar Islands**, include **Nicobar megapode** (*Megapodius nicobariensis*); **Nicobar serpent eagle** (*Spilornisklossi*) and **Andaman crane** (*Rallinacanningi*).

Bird diversity in India:

- **India** is home to **12.40%** of the global bird diversity; **1,353 bird species** out of **10,906** documented globally are from **India**.
- The country has **78 endemic bird species**. Of the bird species existing in the country, **28** are found **only in the Western Ghats**, **25** in the **Andaman and Nicobar Islands**, **four** in the **Eastern Himalayas**, and **one** each in the **Southern Deccan Plateau** and **Central Indian Forest**.

Special conservation efforts needed to protect endemicity:

- Among the **78 endemic bird species**, **25** are classified as **threatened** as per the International Union for Conservation of Nature (IUCN) categorisation.
- Specifically, **three species** are listed as **critically endangered**, **five** as **endangered**, and **17** as **vulnerable**. Additionally, **11 endemic species** are categorized as **near threatened**.
- **Three endemic species** — **Manipur bush quail** (*Perdiculamanipurensis*), **Himalayan quail** (*Ophrysiassuperciliosa*) and **Jerdon's courser** (*Rhinoptilusbitorquatus*) — have not been sighted in several decades and feared of extinction.

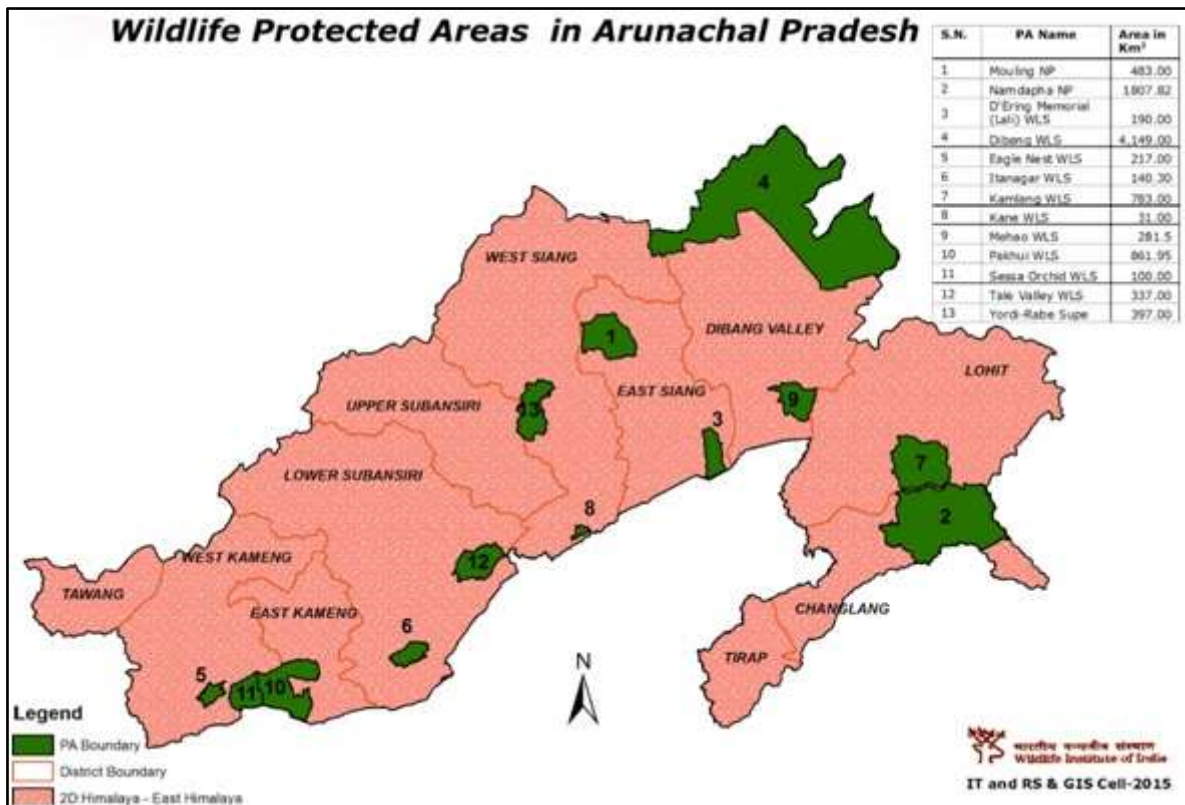


Causes of decline:

- Climate change, habitat loss, fragmentation and degradation.
- The book specifically highlights **four bird species**— **Bugunliocichla** (*Liocichlabugunorum*), **white-bellied sholakili**, **Ashambu laughingthrush** (*Montecinclameridionalis*) and the **Wayanad laughingthrush** (*Garrulaxdelesserti*) - which are **very much habitat specific** and found in very small pockets of India.

Topic 22. A TREASURE TROVE: FIELD NOTES FROM THE FORESTS OF ARUNACHAL PRADESH

Important for the subject: Environment



A book **More Than Just Footnotes: Field Assistants in Wildlife Research and Conservation** is written by **Ambika Aiyadurai**, an anthropologist who teaches at the Indian Institute of Technology, Gandhinagar, and **Mamata Pandya**, an independent writer and editor.

Dibang Wildlife Sanctuary:

- Located in the **Upper Dibang Valley district**.
- As the sanctuary lies in the **Indo-Chinese transition zone**, the flora and fauna of this



region is **highly endemic** and significant. There are over **130 species of birds**, and various types of **snakes**. Some **endangered species** are the **Mishmi takin**, the **Asiatic black bear**, **Musk deer** and the **Blyth's tragopan**.

- The **Mishmi takin (Budorcastaxicolortaxicolor)** is an **endangered goat-antelope native to India, Myanmar and the People's Republic of China**. It is a subspecies of takin.
- The **Mishmi takin** lives in **Northeast India** and eats bamboo and willow shoots. It has an oily coat to protect it from the fog. **Takin** is the **national animal of Bhutan**.
- There are extensive tracts of **primary forests** —the density of population is very low — and the region is rich in biodiversity. There are at least **25 species of mammals** like the **clouded leopard, wild dog, the Asiatic black bear** and the **small clawed otter**, and more than **240 species of birds**.
- Type of cultivation undertaken in the region is known as **Swidden agriculture**, or **shifting cultivation** or **jhum cultivation**, refers to the technique of rotational farming in which land is cleared for cultivation (normally by fire) and then left to regenerate for a few years.
- **Subsistence crops** like **rice, millets and vegetables** are grown, and **Swidden cultivation** intricately binds the forest communities to their cultural identity. The **Adi people** celebrate at least **13 festivals** related to shifting cultivation.
- **Jemeithang valley** is about four hours from **Tawang** and home to the **Monpa tribe**.

Kamlang Tiger Reserve:

- Located in **Arunachal Pradesh**.
- Kamlang is contiguous to the **Namdhapa Tiger Reserve**.
- It is home to **all four big cats** (tiger, leopard, clouded leopard and snow leopard).
- The **Kamlang Tiger Reserve** has several species of **hornbills**. **Rufous-necked hornbills** are common and **Wreathed hornbills** visit in the winters.
- The **Glaw Lake**, considered sacred by the **Mishmis**.

Pakke tiger reserve:

- **Pakke Tiger Reserve**, is a **Project Tiger** reserve in the **East Kameng district** of **Arunachal Pradesh** in **Northeast India**.
- It is bounded by **Bhareli or Kameng River** in the **west and north**, and by **Pakke River** in the **east**.
- The **main perennial streams** in the area are the **Nameri, Khari and Upper Dikorai**. West of **Kameng River** are **Sessa Orchid Sanctuary** and **Eaglenest Wildlife Sanctuary**.
- It was known as **Pakhui Tiger Reserve**, but renamed in **April 2001** by the Governor of Arunachal Pradesh. It has **won India Biodiversity Award 2016** in the category of '**Conservation of threatened species**' for its **Hornbill Nest Adoption Programme**.

Indigenous tribes of Arunachal Pradesh:

- **Kman Mishmis, Nyishi, Monpa, Apatani or Tani, Adi people and Tangshang people or Tangsa Naga** are some of the **26 indigenous tribes** of Arunachal Pradesh.



Topic 23. DANCING FROGS OF WESTERN GHATS AMONG MOST THREATENED AMPHIBIANS GLOBALLY

Important for the subject: Environment

The dancing frogs that are endemic to the Western Ghats are the most threatened amphibian genus of India, according to the Wildlife Trust of India.

Global Amphibian Assessment report released by: IUCN's Species Survival Commission's Amphibian Specialist Group.

- More than 41% of the amphibian species are threatened with extinction. In India, 139 of the total 426 species were categorised as 'Critically Endangered', 'Endangered' or 'Vulnerable' in the International Union for Conservation of Nature Red List of Threatened Species.
- Of the 24 species of the frogs belonging to the *Micrixalus* genus that were assessed, two were found to be critically endangered and 15 were endangered.
- It is also the fifth most threatened genus in the world with 92 per cent of its species in the threatened category.
- Frogs are valuable in the food chain and also provide other ecological services. Protecting the natural habitats and preserving their optimal living conditions is thus vital to save the last of these species.

Dancing frogs:

- The dancing frogs that are found near the streams do a unique display to mate. The males stretch up their hind legs one at a time and wave their webbed toes in the air in a rapid motion akin to a dance.
- This is to attract mates as well as ward off competition, probably preferred because their mating calls are drowned out by the gurgling of the streams. This act is called "foot flagging" and gives the species their name.
- They prefer habitats in areas with thick canopy cover of at least 70-80 per cent. Multiple anthropogenic stresses have impacted the population of the dancing frogs.
- *Micrixalus kottigeharensis* (commonly called the Kottigehar Dancing Frog) is threatened by invasive species like the mosquito fish, land use change, variation in temperature and humidity, extreme weather events such as floods and excess rainfall, infectious diseases, water pollution, light pollution, and infrastructure projects such as dams.
- After the dancing frogs, the *Nyctibatrachidae* (night frogs) are the most threatened with 83.9 percent of its species threatened across the southern states of Karnataka, Kerala and Tamil Nadu.

Amphibian recovery project:

- Wildlife Trust of India's Amphibian Recovery Project in the Munnar Landscape of Kerala is actively working to recover the population of threatened amphibians by addressing the challenges that cause the risk of extinction, threat mitigation through strategically planned conservation action, capacity development and training, advocacy and information sharing implemented by a stakeholder network.



Wildlife trust of India (WTI):

- The **Wildlife Trust of India (WTI)** is an **Indian nature conservation organisation**. **WTI** was formed in **November 1998** in **New Delhi, India**, as a response to the rapidly deteriorating condition of wildlife in India.
- WTI is a **registered charity (non-profit organization) in India** (under Section 12A of the Income Tax Act, 1961).
- **WTI** currently focuses its resources on **six priority landscapes** – northeast India, western Himalayas, terai, southern Ghats system, central India and terrestrial ecosystems. **One of its projects is to protect the Sarus crane**.
- The **Centre for Wildlife Rehabilitation and Conservation** is a **wildlife care facility** that is run by **Wildlife Trust of India** and **Assam Forest Department**, with financial support from **International Fund for Animal Welfare**.
- The **Udanti Tiger Reserve** in **Gariaband district, Chhattisgarh**, is run by **Wildlife Trust of India** and the **Chhattisgarh forest department**.

Topic 24. WORLD LEADERS MUST PRIORITIZE IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT GOALS

Important for the subject : Environment



The **midterm assessment** of the **progress made on the sustainable development goals (SDG)** was carried out in the **2023 SDG Summit**, which took place on September 18-19, 2023, in **New York**.

Global People's Assembly:

- **2,045** activists from **145 countries** joined physically and virtually in the **Global People's Assembly**, organised by **64 civil society organisation networks**, coordinated by **Global Call to Action Against Poverty (GCAP)**.



Sustainable Development Goals (SDG):

- The **2030 Agenda for Sustainable Development**, adopted by **all United Nations Member States in 2015**, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future.
- There are the **17 Sustainable Development Goals (SDGs)** and **169 targets**.

The SDGs build on decades of work by countries and the UN:

- In **June 1992**, at the **Earth Summit in Rio de Janeiro, Brazil**, more than **178** countries adopted **Agenda 21**, a comprehensive plan of action to build a global partnership for sustainable development to improve human lives and protect the environment.
- The **Johannesburg Declaration on Sustainable Development and the Plan of Implementation**, adopted at the **World Summit on Sustainable Development in South Africa in 2002**, reaffirmed the global community's commitments to poverty eradication and the environment, and built on **Agenda 21** and the **Millennium Declaration** by including more emphasis on multilateral partnerships.
- At the **United Nations Conference on Sustainable Development (Rio+20)** in **Rio de Janeiro, Brazil**, in **June 2012**, Member States adopted the outcome document "**The Future We Want**" in which they decided, inter alia, to **launch a process to develop a set of SDGs** to build upon the **MDGs** and to establish the **UN High-level Political Forum on Sustainable Development**.
- In **January 2015**, the **General Assembly** adopted the **2030 Agenda for Sustainable Development**, with **17 SDGs** at its core, at the **UN Sustainable Development Summit** in **September 2015**.

2015 was a landmark year for multilateralism and international policy shaping, with the adoption of several major agreements:

- Sendai Framework for Disaster Risk Reduction (March 2015)
- Addis Ababa Action Agenda on Financing for Development (July 2015)
- Transforming our world: the 2030 Agenda for Sustainable Development with its 17 SDGs was adopted at the UN Sustainable Development Summit in New York in September 2015.
- Paris Agreement on Climate Change (December 2015)
- Now, the **annual High-level Political Forum on Sustainable Development** serves as the central **UN platform** for the follow-up and review of the SDGs.

Assessment of the progress made on SDGs:

- The **United Nation's own estimate** suggests that **only 12 per cent of the targets are currently on track**. **Thirty percent** of the **SDGs** are **worse** now than **eight years ago**.

Poverty:

- There is enough food to feed everyone on the planet, yet over **820 million people**, roughly one in ten people on Earth, are going hungry.
- Nearly **860 million** belong to the **extreme poor category**.

**Inequality:**

- **Oxfam's 2023 report, Survival of the Richest**, suggested that the richest 1 percent has bagged twice as much wealth as the rest during the pandemic.
- The economic structure is heavily tilted towards the benefit of the rich and the social structures further push the people from the marginalised communities into despair, discrimination and indignity.
- The groups that traditionally faced exclusion and discrimination are women, communities discriminated by work and descent (CDWD), indigenous communities, persons with disabilities, the old and the LGBTQI+, among others.
- The welfarist nature of the state is fast dwindling. It's all about corporate growth.

Issues facing by the global south:

- Inequality, crack down on their people's and civil society's rights, political parties are dividing people in the name of religion, caste and race, debt crisis.
- **Sixty countries** are currently facing debt crises amid skyrocketing interest rates.
- **Financial systems** dominated by wealthy Western countries are not creating global prosperity.

Climate change:

- There is no clear commitment to end the use of fossil fuels. Countries like the Philippines, Fiji and others are struggling to cope with the increasing disasters, including sea-level rise.

Topic 25. CLIMATE CRISIS IN FORESTS: WILD FRUITS, SACRED GROVES IN SHARAVATHI VALLEY BEAR THE BRUNT***Important for the subject : Environment***

Due to climate change and changing rainfall patterns, production of fruits from wild trees are decreasing rapidly. **Indian Institute of Science's (IISc) research station in Kumta, Uttara Kannada district of Karnataka.**

- Climatic changes are hitting something much more fundamental in **Siddapur taluk of Uttara Kannada district**. The area is famous for its sacred groves which have conserved ancient forests almost intact.
- Climate change has affected evergreen forests and they are increasingly deciduous, which has also led to a water shortage. **Acacia plantations** have also led to water shortage in these areas.
- Some sacred groves that have witnessed a decline in production are: **Kokum (Garcinia indica) tree, Wild amla or nellikai (gooseberry)** (mainly used for medicinal purposes), **kasarakaya (Strychnosnux-vomica)** (kasarakaya is a medicinal fruit but with poisonous qualities because of the presence of the compound strychnine), **Upagi, monkey jacks, Malabar tamarind, Kathalekan sacred groves.**

Climax species:

- **Climax species**, also called late seral, late-successional, **K-selected** or **equilibrium species**, are plant species that can germinate and grow with limited resources; e.g.



- they need **heat exposure** or **low water availability**.
- They are the species within **forest succession** that are **more adapted to stable and predictable environments**, and will remain essentially unchanged in terms of species composition for as long as a site remains undisturbed.
 - The **seedlings of climax species** can **grow in the shade of the parent trees**, ensuring their dominance indefinitely. The **presence of climax species** can also **reduce the prevalence of other species** within an ecosystem. However, a disturbance, such as fire, may kill the climax species, allowing **pioneer or earlier successional species** to re-establish for a time.
 - They are the **opposite of pioneer species**, also known as **ruderal, fugitive, opportunistic or R-selected species**, in the sense that **climax species are good competitors but poor colonizers**, whereas **pioneer species are good colonizers but poor competitors**.

Sharavathi LTM Wildlife Sanctuary:

- Located in **Western Ghats of Karnataka state in India**.
- Named after the **Sharavathi River** flowing through the sanctuary.
- The sanctuary was expanded by adding the **Aghanashini Lion Tailed Macaque Conservation Reserve** and some of the **reserved forests in Uttara Kannada & Shivamogga districts**, to the existing sanctuary.
- After expansion, the sanctuary has been **renamed** as the **Sharavathi Lion Tailed Macaque Wildlife Sanctuary**.
- The expanded sanctuary is aimed at **protecting the freshwater habitat** of **Myristica swamps** that hosts many species like **Lion Tailed Macaque, Leaf Nosed Bats, Hornbills** etc.

Topic 26. UDAIPUR IN RACE TO BE NATION'S 1ST WETLAND CITY

Important for the subject : Environment

The Rajasthan government is working towards making **Udaipur the country's first wetland city**.

Udaipur, Rajasthan:

- Udaipur is surrounded by **five major lakes** and is already part of the **restoration project of the National Lake Conservation Plan**.
- The state environment and forest department is sending a nomination to the **Ramsar Convention** to **declare Udaipur as a wetland city**.
- The **convention recognizes wetlands** that are **internationally important and support endangered species**.
- Currently, there are **only a few cities worldwide that have this title**.

Internationally important wetland:

- As per **Ramsar Convention**, a wetland has to be considered **internationally important** if it contains a **representative, rare, or unique example of a natural or near-natural wetland type** found within the **appropriate biogeographic**



region and supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

- As per state authorities, **Udaipur city**, spread over **37 sq km**, meets all the required criteria to be declared as a wetland city.

Wetland city:

- **Only a handful of cities in the world** have been given this title. Other than **Udaipur, Bhopal is also in the race for the tag.**
- The **Ramsar Convention on Wetlands of International Importance**
- Currently, there are **42 wetland cities** spread across **17 countries worldwide**, with **China having the maximum or 13 such cities.**

Accredited wetland cities:

- **2022: During COP14** the Convention recognized **25 cities** for their efforts to safeguard urban wetlands for people and nature.
- **Cities accredited:** **Canada:** Sackville, **China:** Hefei; Jining; Liangping; Nanchang; Panjin; Wuhan; and Yangcheng, **France:** Belval-en-Argonne and Seltz, **Indonesia:** Subaraya and Tanjung Jabung Timur, **Islamic Republic of Iran:** Bandar Khamir and Varzaneh, **Iraq:** Al Chibayish, **Japan:** Izumi and Niigata, **Morocco:** Ifrane, **Republic of Korea:** Gochang; Seocheon; and Seogwipo, **Rwanda:** Kigali, **South Africa:** Cape Town, **Spain:** Valencia, **Thailand:** Sri Songkhram District
- **2018: During COP13 the Convention** recognized **18 cities** for their protection and wise use of urban wetlands. These pioneer cities serve as examples and inspire deliberate actions for other cities towards sustainable urbanization.
- **Cities accredited:** **China:** Changde, Changshu, Dongying, Haerbin, Haikou, Yinchuan, **France:** Amiens, Courteranges, Pont Audemer, Saint Omer, **Hungary:** Lakes by Tata, **Republic of Korea:** Changnyeong, Inje, Jeju, Suncheon, **Madagascar:** Mitsinjo, **Sri Lanka:** Colombo, **Tunisia:** Ghar elMelh

Topic 27. MIGRATORY BIRDS ARRIVE IN ODISHA'S CHILIKA BEFORE WINTER; IS CLIMATE CHANGE TO BLAME?

Important for the subject: Environment

Migratory birds have started their annual journey to **Chilika** —India's largest waterbird habitat in Odisha — ahead of winter this year.

Ducks and wigeon species have been seen this year within the **Nalabana bird sanctuary area** inside the **blue lagoon.**



Bird migration to India:

- Migratory birds, mostly from beyond the **Himalayas in Northern Eurasia**, the **Caspian region, Siberia, Kazakhstan, Lake Baikal** and the **remote areas of Russia** and neighboring countries visit the **Chilika** every winter and start their homeward journey before the onset of summer.
- In the last winter, as many as **1,131,929 birds** of **184 different species** had visited **Chilika**. This included **1,093,049 migratory birds** from **105 various species** and **38,859 resident birds** belonging to **79 species**.
- Generally the **migratory birds fly to Chilika** when the **temperature here reaches around 30o**, but this year they arrived when the **temperature is 33-35o**.
- **Cause of early arrival:** Early onset of winter in their native habitats, recent natural disasters in the Himalayan regions might have pushed them to fly to Chilika, scarcity of food in their native habitats

Migratory routes to India:

- Migratory routes are not fixed and in some species part of the population follows one route and parts another. In India, the **winter migrants from central Asia and Siberia** are thought to use **two main routes**; one in the **west** along the **Indus valley** and the other in the **north-east** along the **river Brahmaputra**.

Central Asian flyway (CAF):

- CAF covers a **large continental area of Eurasia** between the **Arctic and Indian Oceans** and the associated island chains. The **Flyway** comprises several important **migration routes of waterbirds**, most of which extend from the **northernmost breeding grounds** in the **Russian Federation (Siberia)** to the **southernmost non-breeding (wintering) grounds** in **West and South Asia, the Maldives and the British Indian Ocean Territory**.
- The birds on their annual migration cross the borders of several countries. **Geographically the flyway region covers 30 countries of North, Central and South Asia and Trans-Caucasus**.
- The CAF covers at least **279 populations** of **182 migratory waterbird species**, including **29 globally threatened and near-threatened species**, which breed, migrate and winter within the region.
- **CAF migration routes** include the **steppes and cold deserts of Central Eurasia**, and much of the **Himalayan chain**, where unique, high-altitude migrations such as those of the **Bar-headed Goose, Anser indicus**, take place.

The important steps taken for protecting migratory birds are given below:

- Rare and endangered species of birds, including migratory birds, are included in Schedule-I of the Wild Life (Protection) Act, 1972 thereby according them highest degree of protection.
- Stringent punishments have been provided for in the Wild Life (Protection) Act, 1972 for violation of the provisions of the Act.
- Important habitats of birds, including migratory birds, have been notified as Protected



Areas under the Wild Life (Protection) Act, 1972 for better conservation and protection of birds and their habitats.

- Financial and technical assistance is provided to the State/UT Governments for protection and management of Protected Areas.
- Wildlife Crime Control Bureau has been established for control of illegal trade in wildlife and its parts and products.

Convention of Migratory Species of Wild Animals:

- CMS is also known as the **Bonn Convention**. It is the **only convention that deals with taking or harvesting of species** from the wild. It currently protects **173 migratory species** from across the globe.
- **Enforcement Year:** November 1, 1983.
- The Secretariat was established in 1984.
- **Parties: 130 Parties** to the Convention— **129 countries** plus the **European Union**. **Maldives** is the latest country to join it.

Species Covered: Convention has two Appendices:

- **Appendix I** lists migratory species that are endangered or threatened with extinction.
- **Appendix II** lists migratory species which have an unfavorable conservation status and which require international agreements for their conservation and management.
- India has been a party to the Convention since **1983**.

Chilika lake and Nalabana Bird Sanctuary:

- Chilika Lake is the **largest brackish water lagoon in Asia** and **second largest coastal lagoon in the world**, spread over the **Puri, Khordha and Ganjam districts of Odisha** state on the east coast of India, at the mouth of the **Daya River**, flowing into the **Bay of Bengal**, covering an area of over 1,100 square kilometres.
- **Nalabana Bird Sanctuary** or **Nalabana Island** is the **core area of the Ramsar designated wetlands of Chilika Lake**. It was declared a bird sanctuary under the **Wildlife Protection Act in 1972**. In the heart of the park, one can see thousands of birds descending during the migratory season.

Topic 28. EVEN TEMPORARY GLOBAL WARMING ABOVE 2°C WILL AFFECT LIFE IN THE OCEANS FOR CENTURIES

Important for the subject: Environment

There is growing consensus that **our planet is likely to pass the 1.5 degrees Celsius warming threshold**. Research even suggests **global warming will temporarily exceed the 2°C threshold**, if **atmospheric carbon dioxide (CO₂)** peaks at levels beyond what was anticipated.

Climate overshoot:

- The **period of time** in which **warming is increasing past the 1.5°C mark and then cooling back down** is called a **climate overshoot**. About 90 percent of climate models predict a period of climate overshoot, with years if not decades of higher global temperatures, before stabilizing at 1.5°C.



- These changes include sea-level rise, less functional ecosystems, higher risks of species extinction, and glacier and permafrost loss.
- Research found that humanity will continue to feel its impacts long after atmospheric CO₂ levels have peaked and declined.

What are the impacts of climate overshoot?

- Long periods of higher global temperatures could result in many different damaging outcomes for a wide variety of ecosystems, including increased coastal flooding and forced human migration, greater devastation and frequency of forest fires, and loss of biodiversity.
- The conversion of new land for agricultural use may put additional stress on animal habitats, and when temperatures level off and cool, we may see animals migrating in search of habitats that no longer exist. Focusing on limiting the end-of-century warming at 1.5°C—rather than what global temperatures may peak at before that point—puts people and nature at risk.

Coupled Model Intercomparison Project (CMIP6):

- The project underpins the **latest assessment reports** by the **Intergovernmental Panel on Climate Change (IPCC)**.
- **Carbon Dioxide Model Intercomparison Project (CDRMIP):** Designed to explore the reversibility of a climate overshoot and how this impacts the Earth system.
- In **viable ecosystems the supply of oxygen needs to exceed their demand**. The **closer supply is to demand, the more precarious ecosystems become**, until demand exceeds supply and these ecosystems are no longer viable.
- The changing ocean temperatures impact the long-term viability of different marine species and their habitats.

What did the study find?

- Across **all climate overshoot experiments and all models**, the findings show the **water volumes that can provide viable habitats will decrease**. This decrease persisted on the scale of centuries – well after global average temperature recovers from the overshoot.
- The study findings **raise concerns about shrinking habitats**.

What are the implications of shrinking marine habitats?

- The **combination of temperature and deoxygenation** shows warming may harm marine ecosystems for hundreds of years after global mean temperatures have peaked.
- There will be a need for **resource management** to avoid compromising **species abundance and food security**.
- **Climate overshoots** not only matter in terms of their peak value but also in terms of how long temperature remains above the target. It is better to **return from an overshoot than staying at the higher level**, but a lot worse than not overshooting in the first place.



Topic 29. AS CARACALS INCH TOWARDS EXTINCTION, PATH TO CONSERVING THE WILD CAT REMAINS UNCLEAR

Important for the subject: Environment

An estimated **50 caracals** are left in the small clusters in the states of **Rajasthan** and **Gujarat**, making **caracal** the **second cat species** after the **Asiatic cheetah** to reach the **brink of extinction in India**.

Factors leading to the decline in the population are yet to be identified. Though experts speculate it could be a **species-specific disease** more data is needed to back their speculations.

- **Large-scale hunting** and **illegal trade** were the **two main causes for the decline** but **poaching and seizure of the cat have not been reported for many decades**.
- In **2021**, the **National Biodiversity Wildlife Board** announced a **Species Recovery Plan** for the **conservation and population revival of 22 species in India**, including the **caracal**.

Caracal (Caracal caracal schmitzi):

- A small wild cat noted for its long-tufted ears and a reddish-tan or sandy-brown coat.
- The feline, with distinctive black markings on its face and white circles around the eyes and mouth, is **native to Africa, the Middle East, Central Asia** and **arid areas of Pakistan** and **north western India**.
- Typically **nocturnal**, the caracal is **highly secretive and difficult to observe**. It is **territorial**, and lives mainly alone or in pairs.
- The **caracal is a carnivore** that typically preys upon **birds, rodents, and other small mammals**.
- After the **Asiatic cheetah**, which was declared **extinct in 1952**, the **caracal** will be the **second cat species** to be wiped out from the country.

Protection status:

- The species is **listed under 'least concern'** under the **IUCN Red List globally**, it has been listed as **'near threatened'** by the **Conservation Assessment and Management Plan (CAMP)** and **IUCN Red List assessment in India**.
- The species is included in the **Schedule-I category** of the **Indian Wildlife (Protection) Act, 1972**, offering it the highest possible protection.

Habitat range:

- It is a species of **wasteland, open forests and shrublands**. Historically, the **caracal** was found **all across Central India** and the **Indo-Gangetic plains**. But there has been **no sighting of the animal in these regions for the last 40 years**.
- Some **28 caracal individuals** are found in the **Ranthambhore Tiger Reserve** in **Rajasthan** and around **20 in Kutch** in **Gujarat**.

Assessment for conservation of the species:

- In **2022**, **WII** along with the **Indian Space Research Organisation (ISRO)**, **Madhya**



- Pradesh Forest Department and Leo Foundation of The Netherlands** conducted a study in **nine states** – Chhattisgarh, Delhi, Gujarat, Jharkhand, Haryana, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh – on the **presence of caracals**.
- The study indicated that areas in **Kutch (Gujarat), Aravalli mountains (Rajasthan), Malwa plateau (Rajasthan and Madhya Pradesh)** and **Bundelkhand region (Madhya Pradesh)** were **potentially suitable habitats for caracals**.
 - It further identified the **Ranthambore-Kuno Landscape (RKL)**, which falls in **Rajasthan and Madhya Pradesh**, as a **highly potential caracal habitat area** and a suitable site for the conservation of the feline. The **Madhya Pradesh Biodiversity Board** is also undertaking a study on caracals in this landscape.
 - **Rajasthan Forest Department** is planning to start a breeding programme for caracals.

Topic 30. INDIA'S GREEN CREDIT PROGRAMME

Important for the subject: Environment

Why is the Green Credit Programme in the News?

Ministry of Environment, Forest and Climate Change notified the draft '**Green Credit Programme (GCP)**' implementation rules for 2023.

It was **first announced in the 2023-24 Union Budget** to encourage environmental actions through market-based incentives.

Follow-up action of the '**LiFE**' campaign.

Incentivizes positive environmental actions through **tradeable green credit**.

Overview of the Green Credit Programme:

- 'Green Credit' refers to **incentives for environmentally positive activities, complementing the domestic Carbon Market**.
- It aims to **incentivize diverse eco-friendly actions beyond just CO2 emission reductions**.

8 Key Activities Eligible for Green Credits:

- Tree Plantation, Water Conservation, Sustainable Agriculture, Waste Management, Air Pollution Reduction, Mangrove Conservation, Ecomark Acquisition, and Sustainable Building and Infrastructure.

Administration and Significance:

- The Indian Council of Forestry Research and Education (**ICFRE**) will **administer the program**.
- It **encourages private sector compliance with existing environmental obligations, fostering sustainable practices** and providing support for organic farmers and FPOs.



Concerns Regarding the Green Credit Mechanism:

- Potential risks of **greenwashing** as **companies might engage in superficial activities** for credit generation without addressing underlying environmental concerns.
- **Allocation of resources for monitoring and fraud prevention** instead of transformative initiatives might be a challenge.

Green Credit Registry and Trading Platform:

- Includes the establishment of a **Green Credit Registry**. Administrator responsible for setting up and maintaining a trading platform.
- **Overview of LiFE Movement (Lifestyle for the Environment (LiFE) movement):**
 - India introduced the concept during the **26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow in 2021**.
 - LiFE encourages an **environmentally conscious lifestyle, emphasizing mindful and deliberate utilization over mindless and wasteful consumption**.
 - A circular economy, driven by **conscious and deliberate consumption**, is promoted as an alternative to the **prevalent “use-and-dispose” economy**.

Objectives of the LiFE Movement:

- The movement aims to utilize social networks to **influence climate-centric social norms**.
- It plans to establish a **global network of individuals termed ‘Pro-Planet People’ (P3)** who are committed to adopting and advocating for eco-friendly lifestyles.
- The P3 community will **foster an ecosystem that encourages sustainable environmental practices and aims to sustainably reinforce environmentally friendly behaviors**.

“Meri LiFE” (My Life) mobile application

- Ministry of Environment, Forest, and Climate Change (MoEF&CC) recently launched the “Meri LiFE” (My Life) mobile application, **aiming to empower youth and encourage their active participation in addressing climate change**.
- The app focuses on **five key LiFE themes**, including **saving energy, water, and reducing single-use plastic, adopting sustainable food systems, and promoting healthy lifestyles**.
- Moreover, the app includes a **“5 for 5 Challenge,”** engaging users in **five LiFE actions** leading up to World Environment Day on June 5th, 2023.
- Additionally, the **ministry has developed two portals:**



- The Mission LiFE Portal, providing access to a plethora of creative videos and knowledge materials related to LiFE, and the Meri LiFE Portal, enabling institutions to upload event reports and monitor the progress of the ongoing mass mobilization initiative.

Carbon Credit:

- A tradeable credit representing the right to emit a set amount of carbon dioxide or an equivalent greenhouse gas.
- Equals one tonne of carbon dioxide removed, reduced, or sequestered from the atmosphere.

Carbon Credit Trading Scheme (CCTS):

- A scheme for the reduction or removal of greenhouse gas (GHG) emissions notified by the central government.

Background of CCTS:

- The Energy Conservation (Amendment) Bill, 2022, empowered the central government to specify the carbon trading scheme in consultation with the Bureau of Energy Efficiency (BEE).

Features of CCTS:

- **Accredited carbon verifier:** An agency accredited by the BEE for validation or verification
- **Setting up of Indian Carbon Market Governing Board (ICMGB):** Oversees the Indian carbon market, establishes rules, and regulates the sale of carbon credit certificates.

Role of Environment Secretaries: They serve as ex-officio co-chairmen of ICMGB.

- **Bureau of Energy Efficiency (BEE):** Acts as the administrator and secretariat for the Indian carbon market and the ICMGB.
- **Grid Controller of India Ltd:** Serves as the registry for the Indian Carbon Market.
- **Central Electricity Regulatory Commission (CERC):** Acts as the regulator for trading activities under the Indian carbon market.

About Greenwashing

- **Greenwashing** refers to the practice where firms and governments falsely market various activities as climate-friendly or environmentally responsible, often without verifiable evidence or with misleading claims.
- **Origin:** Coined in 1986 by Jay Westerveld, an American environmentalist and researcher.



- **Involves labeling activities as climate-friendly, promoting emissions reduction, or avoidance of emissions,** even when such claims lack credibility or are dubious.
- Typically employed to **improve the image of the entity while making little to no tangible impact in the fight against climate change.**
- Several multinational corporations, **including oil giants like Shell and BP, and Coca Cola, have faced allegations of greenwashing.**

About ICFRE

- The Indian Council of Forestry Research and Education (ICFRE) is an **autonomous organization or governmental agency under the Ministry of Environment, Forest and Climate Change** of the Government of India.
- It was **established in 1986** and operates as a council for **coordinating and managing forestry research** and education in the country.
- ICFRE is responsible for **carrying out scientific research on issues related to forestry,** as well as for providing training and education in the field of forest management and conservation.
- It also plays a crucial role in the **formulation and implementation of policies and programs related to forests and the environment.**

Topic 31. IMPACT OF DISASTERS ON AGRICULTURE AND FOOD SECURITY

Important for the subject: Environment

Key points from the article **“Farmers lost \$3.8 trillion to disasters over 30 years: FAO’s first-ever global estimation”**:

Global Losses: Estimated \$3.8 trillion worth of crops and livestock production lost due to natural disasters over the last 30 years, **averaging around \$123 billion per year, accounting for 5% of annual global agricultural GDP.**

- **Crop and Livestock Losses:** Major losses were observed in cereals, fruits, vegetables, sugar crops, meats, dairy products, and eggs, with **cereals accounting for an average loss of 69 million tonnes per year, followed by fruits and vegetables, and sugar crops, each experiencing 40 million tonnes of losses annually.**
- **Regional Disparities:** **Asia, Africa, Europe, and the Americas displayed similar levels of losses,** although the impact varied significantly across different subregions and country groups.
- **Impact on Countries:** **Lower and lower-middle-income countries experienced the highest relative losses, up to 15% of their total agricultural GDP,** while Small Island Developing States lost nearly 7% of their agricultural GDP.
- **Importance of Resilience:** Proactive and timely interventions in response to forecasted hazards are crucial to build resilience. **Investing in anticipatory action can lead to significant benefits, with rural families gaining up to \$7 for every \$1 invested and avoiding agricultural losses.**
- **Priorities for Action:** The report emphasizes the **need to improve data and information on the impacts of disasters, develop multi-hazard disaster risk reduction approaches, and enhance investments in resilience that yield benefits in**



reducing disaster risk and improving agricultural production and livelihoods.

About Climate-resilient agriculture (CRA)

- **Climate-resilient agriculture (CRA)** plays a crucial role in ensuring sustainable agricultural practices and enhancing the **adaptability of farming systems to climate change**.
- **Resilience within the context of agriculture** refers to the **capability of agricultural systems to effectively and flexibly respond to, recuperate from, and flourish in the face of varying climate conditions, while preserving their fundamental functions, identities, and structures**. Climate-resilient agriculture involves the **strategic and sustainable utilization of existing natural resources, aiming to achieve long-term improvements in both productivity and farm incomes**, particularly when faced with unpredictable climate fluctuations and uncertainties.

Impact of disasters on agriculture in India (leading to substantial economic and agricultural losses)

- **Economic Losses:** Disasters such as **floods, droughts, cyclones, and other extreme weather events have resulted in substantial economic losses** in the agricultural sector.
- **Crop Damages:** Crop damages have been a major consequence of these disasters, leading to **decreased agricultural productivity and income for farmers**.
- **Livestock Impacts:** Livestock, including cattle, poultry, and other animals, have also faced severe impacts, **leading to a decline in livestock production and associated income**.
- **Smallholder Vulnerability:** Smallholder farmers are particularly vulnerable to the impact of disasters, as **they often lack the resources and infrastructure to cope with and recover from such events**.
- **Food Security Concerns:** Agricultural disasters have also raised concerns about food security, as they directly **affect the availability and accessibility of food** for both rural and urban populations.
- **Government Initiatives:** The Indian government has implemented various initiatives, including **crop insurance schemes, disaster relief funds, and support programs**, to assist farmers in coping with the aftermath of agricultural disasters.
- **Climate Change Adaptation:** With the increasing frequency and intensity of climate-related disasters, there is a growing emphasis on **climate change adaptation measures in Indian agriculture, including the promotion of climate-resilient crops and farming practices**.
- **Research and Development:** Research and development efforts are ongoing to **develop and promote technologies and practices that can help mitigate the impact of disasters on Indian agriculture** and enhance the resilience of farming communities.
- Various government efforts in India to promote sustainable agriculture and environmental protection:
- **National Mission of Sustainable Agriculture:** Initiated in 2010 to **promote the efficient and sustainable management of resources for agricultural development**.



- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** Launched in 2015 to encourage the adoption of micro-irrigation and drip irrigation systems, aiming to conserve water in agriculture.
- **Paramparagat Krishi Vikas Yojana:** Implemented to promote climate-smart agricultural practices and the adoption of appropriate technologies.
- **Green India Mission:** Launched in 2014 to enhance and protect forest covers, thus contributing to climate change mitigation and ecological balance.
- **Soil Health Card Scheme:** Initiated to facilitate soil testing and provide guidance to farmers regarding the appropriate use of fertilizers, aiming to maintain soil fertility.
- **Neem-Coated Urea:** Introduced to curtail the excessive usage of urea fertilizers, thereby safeguarding soil health and promoting sustainable agricultural practices.
- **Zero Budget Natural Farming (ZBNF):** is an innovative agricultural practice that promotes natural farming without the use of chemical fertilizers and pesticides.
- **National Project on Organic Farming and National Agroforestry Policy:** Implemented to encourage the adoption of organic farming techniques and agroforestry, ensuring both financial benefits and ecosystem conservation.
- **Organic Farming Initiatives in Andhra Pradesh, Himachal Pradesh, Sikkim:** These states have actively promoted and adopted organic farming practices to ensure sustainable and environmentally friendly agricultural production.
- **ICAR Climate-Resilient Villages:** The establishment of climate-resilient villages in 151 districts, focusing on building villages with a positive carbon footprint.
- **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA):** Initiated in 2005 to provide employment opportunities, economic stability, and environmental conservation in rural areas.
- **About Climate-Smart Agriculture (CSA)**
- **Climate-Smart Agriculture (CSA)** is a comprehensive approach designed to aid agricultural system managers in effectively responding to the challenges posed by climate change.

The key objectives of the CSA approach are:

- **Sustainable Productivity and Income Increase:** The aim is to promote agricultural practices that enable the sustainable escalation of productivity and income for farmers and stakeholders involved.
- **Adaptation to Climate Change:** The focus is on implementing strategies and practices that facilitate the adaptation of agricultural systems to the impacts and changes brought about by climate variations and unpredictability.
- **Reduction of Greenhouse Gas Emissions:** The approach also emphasizes the reduction of greenhouse gas emissions, wherever feasible, by incorporating eco-friendly practices and methods within the agricultural processes.



Topic 32. THE YOM KIPPUR WAR

Important for the subject: International Relations

The surprise attack by Hamas on Israel has brought back memories of the Yom Kippur war

What was Yom Kippur war:

- The **Yom Kippur War**, also known as the **October War** or **Ramadan War**, occurred from **October 6 to 25, 1973**, pitting **Israel** against **Egypt** and **Syria**.
- Following **Israel's dominant Six-Day War victory in 1967**, the conflict marked the **Fourth Arab-Israeli War**.
- **Egypt and Syria** launched a **coordinated surprise attack during the Holy Islamic** month of **Ramadan**, initially gaining ground.
- Israel eventually counterattacked, leading to a **ceasefire mediated by the UN**, but **not before the superpowers, the US and the Soviet Union, got involved**, and Israel's invincibility image was challenged.

What is Yom Kippur:

- Yom Kippur is the **holiest day in Judaism and Samaritanism**.
- It is also known as the **Day of Atonement**.
- It is **observed on the 10th day of the lunar month of Tishri**, which falls in September or early October.

Why was the significance of the Yom Kippur war:

- The **Yom Kippur War** was significant because it **revealed Israel's vulnerability**, despite eventual victory. Egypt's goal was to bruise Israel, not defeat it outright.
- The war prompted **negotiations, leading to the 1978 Camp David Accords**, with **Israel returning the Sinai Peninsula to Egypt** and **establishing the first Arab-Israeli peace treaty in 1979**. However, **Syria gained no benefits** and saw **Israel expand its occupation of the Golan Heights**.

Why is the current violence being compared with the Yom Kippur war:

- First it marks the **deadliest assault on Israel since the Yom Kippur war**, where over 2,500 Israeli soldiers lost their lives.
- The second similarity is the **criticism within Israel** for the state being found unprepared. The recent **attack came as a surprise, despite Israel's advanced intelligence and interception systems**.
- This attack came when **many Israelis were preparing to observe Simchat Torah**, which marks the **end of the annual cycle of public Torah readings**, and the beginning of a new one.
- The Torah **constitutes the first five books of the Hebrew Bible**.



Topic 33. GAZA'S 100-YEAR HISTORY OF WAR

Important for the subject :International Relations

Before Haifa, Gaza:

Ten months before the **Battle of Haifa**, Indian lancers and Gurkha riflemen played a pivotal role in the **Third Battle of Gaza** in November 1917.

They fought alongside the **Empire forces** against the **Ottomans**, commanded by **German General Kress von Kressentstein** and **Erich von Falkenhayn**, the former Prussian Minister of War.

- The **Imperial Service Cavalry Brigade**, composed of Indian troops, engaged in intense battles and strategic maneuvers, ultimately leading to the **retreat of the Ottoman forces from Gaza** and the **northeastern end of the Gaza Strip**, marking a turning point in the Palestine campaign.

The history of Gaza after 1918:

- **Gaza came under British control in 1918** after the Ottomans were defeated in World War I. After the **1948 Arab-Israeli War**, it fell into **Egyptian hands**. An Egyptian puppet government was **dissolved in 1959** when **Egypt took control**.
- In **1967**, **Israel launched preemptive strikes** against Egypt, leading to its **occupation of Gaza, the Sinai Peninsula, the West Bank, and the Golan Heights**.
- This **Six-Day War** resulted in a clear Israeli victory, reshaping the region's dynamics and conflicts.
- The **Yom Kippur War in 1973**, despite an Israeli victory, made it clear that a continuous state of war was unsustainable.

Efforts to negotiate peace escalated as **Egypt moved away from the Soviet sphere**.

- The **Camp David Accords of 1978** brought **significant changes**, with **Israel agreeing to withdraw from Sinai** in exchange for **diplomatic relations with Egypt and recognition of Palestinian rights**.
- The Accords earned **President Anwar Sadat and Prime Minister Menachem Begin the Nobel Peace Prize**, leading to the **1979 Egypt-Israel peace treaty**.
- The **Oslo Accords in 1993 and 1995** established the **Palestinian National Authority** and led to the **coexistence of Fatah-controlled areas in the West Bank and Hamas-controlled Gaza Strip**.
- That year, **Hamas, the militant Palestinian organization, founded in 1987** with the aim of **armed resistance to Israeli occupation, won the elections**. A year later, they **ousted Fatah** which was co-founded by **Yasser Arafat in 1959** and which is now led by **President Mahmoud Abbas from Gaza**, and took full control of the Strip.
- **Ariel Sharon's government unilaterally dismantled Israeli settlements in the Gaza Strip in 2005**, leading to **criticism and concern over Hamas's rise to power**.
- After **Israel's disengagement plan in 2005**, Israeli settlements were removed, and around **9,000 settlers were evacuated from the Gaza Strip**.
- While **Palestinians were promised control over the territory, Israel retained**



authority over Gaza's airspace and territorial waters according to the Oslo agreements.

- The Gaza Strip **initially had seven border crossings** for the movement of goods and people. However, **due to a blockade imposed in 2007**, only the **Rafah crossing in Egypt and the Erez crossing in northern Gaza with Israel remain accessible** to people.
- Israel faces criticism for its perceived restrictions and control over Gaza, likened by some to an **open-air prison**.

Topic 34. SERIOUS CONSIDERATIONS, INTEREST IN INDIA ON HOSTING OLYMPICS

Important for the subject: International Relations

The head of the International Olympic Committee (IOC) has noted that there is significant interest and deliberation within India about hosting the Olympic Games. The **President of the International Olympic Committee Thomas Bach** has acknowledged that **India has shown an interest in hosting the Olympic Games in 2036**.

- While the **official bidding process** is yet to commence Bach mentioned that there are **considerations within India**.
- He highlighted **India's performance in sport events**, particularly their diverse medal collection at the Asian Games.
- Bach also **addressed concerns regarding India's bid and** reassured that any issues related to the 2010 Commonwealth Games are unlikely to impact it.
- He **emphasized the importance of governance** by the Indian Olympic Association (IOA) as they are **responsible for representing India in its candidacy**.
- Furthermore **Bach expressed his excitement** about including **T20 cricket in the Olympics** due to its **appeal and potential growth in the United States**.

Some details about Olympic Association:

- The International Olympic Committee is a **non-governmental sports organization based in Lausanne, Switzerland**.
- It is **constituted in the form of an association** under the **Swiss Civil Code (articles 60–79)**. It was **founded in 1894 by Pierre de Coubertin and Demetrios Vikelas**, it is the authority responsible for organizing the modern **Summer, Winter, and Youth Olympic Games**.
- **Demetrios Vikelas** was the **first president** of the IOC.
- **141st session** of IOC is being held in **Mumbai**.

Some details about Indian Olympic Associations:

- Indian Olympic Association (IOA) was **established in 1927** as a **Non-Profit Organization under Societies Registration Act, 1860**.
- It was founded by **Sir Dorabjee Tata and Dr. A.G. Noehren**.
- It is an **autonomous body** recognised by the **Ministry of Youth Affairs and Sports**.



- India first participated in the Olympics in 1900 in Paris. The country was represented by Norman Pritchard, an Anglo Indian.
- A 32-member Executive Council, headed by President and assisted by different Standing Committees that includes Important for the subject-field experts work for effective governance.

The election for the Executive Council is held once every 4 years.

Next Summer and Winter Olympics:

Paris (France) –2024 Summer Olympics

Milano Cortina (Italy) –2026 Winter Olympics

Los Angeles (United States) –2028 Summer Olympics

Topic 35. INDIA LIKELY TO SKIP CHINA’S BRI SUMMIT

Important for the subject: International Relations

India has decided to skip BRI meet. India did not attend the summits in 2017 and 2019, having raised concerns about the BRI.

Russian President Vladimir Putin is expected to attend the Belt and Road Forum (BRF) in Beijing, with the Russian leader also present at the previous two summits in 2017 and 2019.

Why India didn’t attend?

- India has concerns over the flagship China Pakistan Economic Corridor (CPEC) project which runs through Pakistan-occupied Kashmir.

What is China’s Belt and Road Initiative?

- The **Belt and Road Initiative (BRI)**, also known as the **One Belt, One Road (OBOR) Initiative**, is a massive **infrastructure and economic development** project launched by the **People’s Republic of China in 2013**.
- The initiative **aims** to promote economic cooperation and connectivity among countries primarily in **Asia, Europe, and Africa**, through the construction of **infrastructure networks, including roads, railways, ports, and pipelines**, as well as the development of **trade and investment corridors**.

Components

The Belt and Road Initiative consists of two main components:

- The **Silk Road Economic Belt**: This land-based component seeks to connect China to Europe through a network of roads and railways that traverse Central Asia and the



Middle East.

- The **21st Century Maritime Silk Road**: This sea-based component aims to link China to Southeast Asia, South Asia, Africa, and Europe through a network of ports and shipping routes.

Objective:

- The BRI is intended to **enhance trade, investment, and economic development** in the **participating countries**, as well as to strengthen China's economic ties with other nations. It is often referred to as a modern version of the ancient Silk Road trade routes that connected China to the rest of the world.

Status:

BRI projects in South Asia

- China Pakistan Economic Corridor (CPEC): It involved multiple projects, including the development of a port in the city of Gwadar in the **Balochistan** province, providing a port to China's Xinjiang province that would be closer than other eastern ports in China.
- China envisioned that Gwadar would provide it with a position on the Arabian Sea without having to go through the busy shipping lane of the **Malacca Strait**. Some other projects included power — the bulk of the investment — transport, and telecommunication
- **Main Line 1 (ML-1) rail**: The project involved the total overhaul of the 1,872-km ML-1 railway line from Peshawar to Karachi
- **Gwadar development**— At the centre of the CPEC was the \$700-million development of the arid city of Gwadar, with an estimated population of over two lakh, into a smart port city that would become the “Singapore of Pakistan”. Gwadar is strategically important as it is an hour's drive from Iran and less than 320 km from Oman.
- According to the master plan for Gwadar's development under BRI, approved in 2020, it would increase the city's GDP to \$30 billion by 2050 and create over a million jobs
- **Orange Line Metro**: The \$1.6-billion Orange Line Metro covering 27 km in Lahore, described as “China's gift” to Pakistan, became operational in late 2020.

Sri Lanka:

- Colombo International Container Terminal (CICT) at the Colombo port, where a Chinese state-owned firm holds an 85 per cent stake under a 35-year Build-Operate-Transfer (BOT) agreement.



- Central Expressway project connecting with two other highways- the Outer Circle Highway and the Colombo-Katunayake Expressway
- **Hambantota port:** Some BRI projects in Sri Lanka have been described as white elephants- such as the Hambantota port, a deep seaport on the world's busiest east-west shipping lane, which was meant to spur industrial activity. The port had always been secondary to the busy Colombo port until the latter ran out of capacity.
- **Airport:** The Hambantota International Airport or the Rajapaksa Airport, built with a \$200 million loan from China became operational in 2013. Described as the "world's emptiest airport" it is used sparingly, and was unable to cover its electricity bill at one point.

Nepal

- Himalayan railway project Kerung-Kathmandu Rail link will connect Kerung city (also known as Gyirong) in south Tibet to the Nepalese capital of Kathmandu. The rail link is the extension of the railroad being built to connect China's Qinghai province to Tibet.

Maldives

- A 2 km long Sinamale bridge or the China-Maldives Friendship Bridge- a \$200 million four lane bridge.

Bangladesh

- BRI projects include China-Bangladesh Friendship Bridges, special economic zones (SEZs), the \$689.35 million-Karnaphuli River tunnel project, upgradation of the Chittagong port, and a rail line between the port and China's Yunnan province.
- Multiple projects have been delayed, however, owing to the slow release of funds by China. Besides, the Marine Drive Expressway was hampered after Sri Lanka blacklisted the Chinese company building it, over bribery reports. Work on the project is now expected to start in 2022.

India 's Concerns:

- Debt trap
- Sovereignty Issue
- Encircle India



Topic 36. A BRIEF INTRODUCTION TO THE POLITICAL PLAYERS IN PALESTINE

Important for the subject: International Relations

Last week's attack on Israel has brought not just Hamas under the spotlight, but also other significant players in Palestine such as Fatah, Palestine Islamic Jihad (PIJ), Palestine Liberation Organisation (PLO), and Palestinian Authority (PA).

Some more details in brief:

Fatah:

- Fatah, a **Palestinian nationalist organization**, was **founded in the late 1950s**, aiming to conduct an **armed struggle to liberate Palestine**.
- After **military activities from Jordan and Lebanon**, it joined the **Palestine Liberation Organization (PLO)**.
- In the **1970s**, Fatah transitioned to **negotiations with Israel** and signed the **Oslo Accords in the 1990s**, leading to the **creation of the Palestinian Authority (PA)**.
- It now **leads the Palestinian Authority**, governing part of the **West Bank** but lost control of **Gaza to Hamas in 2006 elections**.

Hamas:

- Hamas is the **largest Palestinian militant Islamist group** and one of the two major political parties in the region.
- Currently, it governs more than **two million Palestinians** in the **Gaza Strip**. It was **founded in the late 1980s**, after the beginning of the **first Palestinian intifada**
- The organization, however, is **also known for its armed resistance** against Israel
- Hamas as a whole, or in some cases its **military wing**, is **designated a terrorist group by Israel, the United States, the European Union, the United Kingdom, and other countries**.

Palestine Islamic Jihad (PIJ):

- The **Palestinian Islamic Jihad (PIJ)**, the **second-largest militant group** in Palestine, **aims to replace Israel with an Islamic Palestinian state** using force.
- **Established in 1981**, it has **ties to Egypt's Muslim Brotherhood** and receives **financial support from Iran**.
- While **aligned with Hamas**, PIJ differs as a **smaller, secretive militia** focused on **armed struggle**, unlike Hamas, which is larger and has governance roles in Gaza.
- PIJ has **engaged in student politics and participated in Palestinian university elections since the 1980s**, as well as the **1996 legislative elections**.

Palestine Liberation Organisation (PLO):

- The **Palestine Liberation Organization (PLO)** was **formed in 1964**, initially aiming to **liberate Palestine through armed struggle**, with **Fatah as the dominant faction**.
- **Yasser Arafat led the PLO until 2004**, followed by **Mahmoud Abbas**.



- While it engaged in armed struggle into the 1990s, the PLO gained international recognition as the legitimate representative of the Palestinian people.
- It endorsed a two-state solution in 1988, and a significant shift occurred in the early 1990s when it renounced armed struggle and recognized Israel's statehood, leading to the emergence of Hamas.

Topic 37. P20 SUMMIT

Important for the subject: International Relations

Prime Minister Shri Narendra Modi will inaugurate the 9th G20 Parliamentary Speakers' Summit (P20) on 13 October 2023 at Yashobhoomi, New Delhi

More about the news:

What is P20 Summit:

- P20 is a **congregation of Parliamentary Speakers** from the Parliaments of G20 nations.
- It is a meeting which **pertains to Speakers and presiding officers of the Parliament from the G20 countries** and invitee nations.
- The P20 group was **set up during the G20 Presidency of Canada in 2010**.
- The P20 **provides an opportunity to deepen the recognition of G20 member nations'** efforts and methods of international collaboration in related policies by deliberating upon emerging issues faced by the global community.

Some more details about the P20 summit 2023;

- The theme of the 9th P20 Summit is **“Parliaments for One Earth, One Family, One Future.”**
- There will be **four high-level sessions** organized during the P20 Summit, to be **hosted by Parliament from October 12-14** on
- **Agenda 2030 for Sustainable Development Goals (SDGs): Showcasing Achievements, Accelerating Progress,**
- **Sustainable Energy Transition — Gateway to Green Future, Mainstreaming Gender Equality, From Women's Development to Women-led Development**

Transformation in people's lives through Public Digital Platforms.

- These sessions **aim to facilitate discussions among G20 members** and guest countries on advancing the P20's objectives.
- The summit also highlights the **“LiFE is Beautiful” initiative**, promoting eco-friendly practices for a sustainable ecosystem.
- The **Pan-African Parliament will take part in the P20 Summit for the first time after the African Union became a member of G20** at the New Delhi G20 Leaders' Summit



Topic 38. WHAT WAR CRIMES LAWS APPLY TO THE ISRAEL-PALESTINIAN CONFLICT

Important for the subject: International Relations

The recent conflict between Israel and Palestinian forces since militant group Hamas' weekend assault.

What laws govern the conflict:

- International rules for armed conflict originated from the **1949 Geneva Conventions, ratified by all UN member states.**
- These rules are **encompassed in the "Law of Armed Conflict" or "International Humanitarian Law,"** governing the **treatment of civilians, soldiers, and prisoners of war.**
- The law is **applicable to government forces** and organized armed groups, including Hamas militants.
- **The International Criminal Court (ICC) in The Hague is the primary international body** for bringing charges if alleged perpetrators of atrocities are not prosecuted locally.
- The **ICC can investigate crimes** on its members' territory or by their nationals when domestic authorities are "unwilling or unable" to do so.
- The **ICC's prosecutor's office confirmed its mandate applies to potential crimes** in the current conflict and is actively collecting information.

What are war crimes:

- War crimes **encompass grave breaches of humanitarian laws** within conflicts.
- **The Rome Statute of the ICC provides the definition, which draws from the principles of the 1949 Geneva Conventions.**
- It **centres on the principle of individual accountability for actions committed on behalf of a state or its armed forces.** Illustrative examples include **hostage-taking, deliberate killings, torture or inhumane treatment of prisoners of war, and the recruitment of child soldiers.**

What is Criteria for War Crimes:

- **International humanitarian law employs three key principles** to determine whether an individual or military has committed a war crime:
- **Distinction:** This principle **forbids targeting objectives** that are likely to cause **excessive harm to civilians or civilian infrastructure** compared to the expected military advantage.
- **Proportionality:** Proportionality **restricts the use of disproportionate force in response to an attack.** For instance, it prohibits indiscriminate retaliation, such as bombing an entire city for the death of a single soldier.
- **Precaution:** Parties involved in a conflict are **obligated to take measures that prevent or minimize harm** to the civilian population.



What are the Geneva Conventions (1949):

- The Geneva Conventions, **established in 1949** along with their **Additional Protocols**, represent crucial international agreements that **set forth fundamental regulations to mitigate the cruelty of armed conflict**.
- These conventions **provide safeguards for non-combatants** i.e civilians, medical personnel, humanitarian workers and individuals who are no longer able to participate in combat i.e injured, sick, and shipwrecked military personnel, as well as prisoners of war.
- The **First Geneva Convention** protects **wounded and sick soldiers on land during war**. The **Second Geneva Convention** protects **wounded, sick and shipwrecked military personnel at sea during war**.
- The **Third Geneva Convention** applies to **prisoners of war, including a wide range of general protections such as humane treatment, maintenance and equality across prisoners, conditions of captivity, questioning and evacuation of prisoners, transit camps, food, clothing, medicines, hygiene and right to religious, intellectual, and physical activities of prisoners**.
- The **Fourth Geneva Convention** protects **civilians, including those in occupied territory**. The other Geneva Conventions were concerned mainly with combatants rather than civilians.
- **Two Protocols of 1977:** Additional to the four 1949 Geneva Conventions were adopted in 1977. They **strengthen the protection of victims of international (Protocol I) and non-international (Protocol II) armed conflicts** and place limits on the way wars are fought.
- In **2005**, a **third Additional Protocol** was adopted creating an **additional emblem, the Red Crystal**, which has the same international status as the **Red Cross and Red Crescent emblems**.

Topic 39. PUTIN VISIT KYRGYZSTAN FIRST FOREIGN VISIT SINCE ARREST WARRANT BY ICC

Important for the subject: International Relations

Russian President Vladimir Putin has **arrived in Kyrgyzstan** on his first foreign trip since the International Criminal Court (ICC) issued a warrant for his arrest for alleged war crimes.

Russian President Vladimir Putin **arrived in Kyrgyzstan**, marking his **first foreign trip after an ICC** warrant for alleged war crimes.

- His **two-day visit** includes a **summit of the Commonwealth of Independent States**, amid concerns of **declining Russian influence in the region**.
- Putin **emphasized Russia's trade partnership** with Kyrgyzstan and highlighted growing trade.
- Putin is **also set to attend ceremonies marking the 20th anniversary of Russia's airbase near Kant**. The ICC had issued a warrant against Putin **for alleged deportation of Ukrainian children to Russia**.

Some facts about International Criminal Court (ICC):



- The International Criminal Court is a **permanent court** to prosecute serious international crimes committed by individuals.
- It tries **crimes such as genocide, war crimes, crimes against humanity**, and aggression.
- The court was **established to fight global impunity** and bring to justice criminals under international law, regardless of their rank or stature.
- It is **different from the United Nations' International Court of Justice**, also at The Hague. The **Head Quarter of ICC is in The Hague, The Netherlands**
- Statute :**Before the ICC became functional in 2002**, its founding treaty was adopted by the UN General Assembly in 1998 in Rome, Italy, thereby making it the **Rome Statute**.

How one can become member of ICC:

- To become a **member of the ICC or State party to the Rome Statute**, countries have to **sign the statute and ratify** it under their respective legislatures.
- 123 countries are currently members of the ICC, with African countries making up the largest bloc.
- Notably, **countries including India, China, Iraq, North Korea and Turkey never signed the Rome Statute**.
- **Others including the US, Russia, Israel and Syria signed, but never ratified**

Some facts about Commonwealth of Independent States (CIS):

- The Commonwealth of Independent States (CIS) is an **intergovernmental organization formed in 1991** by former Soviet Union nations.
- It promotes **cooperation in various domains, including politics, economics, environment, humanitarian, culture**, and more.
- **Founding members comprise Belarus, Russia, and Ukraine**, with other Soviet republics joining later after **signing the Alma-Ata Protocol**.

Now, the Commonwealth of Independent States (CIS) has the following countries as its members:

- **3 Founding members: Russia, Belarus & Ukraine**
- **9 other members: Armenia, Kazakhstan, Georgia, Azerbaijan, Turkmenistan, Tajikistan, Uzbekistan, Moldova and Kyrgyzstan.**
- Headquarters of the CIS is in **Minsk, Belarus**
- Meetings are held periodically on a rotating basis at the CIS countries' capitals

Topic 40. AUSTRALIA'S INDIGENOUS VOICE REFERENDUM

Important for the subject: International Relations

Australians will **vote in a referendum on October 14** to decide whether the **country's indigenous peoples** should be **formally consulted in making laws**.

On October 14, **Australians will participate** in a historic referendum that seeks to **determine whether the nation should formally engage** its indigenous communities in



the legislative process.

- This **upcoming referendum marks the first time** in nearly a quarter-century that a **national constitutional amendment** is being considered.
- The central issue at the **heart of this referendum is the recognition of Indigenous people and the establishment of a representative body** empowered to offer advisory opinions to the parliament.

Who are the ‘First Peoples of Australia’:

- The **native inhabitants of Australia** and its **neighbouring islands** are collectively referred to as the **‘First Peoples of Australia’** or **‘aboriginals.’**
- These individuals have **lived on these lands for countless millennia** prior to the arrival of Europeans in the early 17th century.

What is the need of this referendum:

- The **Aboriginals find no mention in Australia’s 122-year-old Constitution.**
- **Aboriginal people make up about 3.2% of Australia’s population** and track below national averages on most socio-economic measures.
- According to a government booklet containing information that would help people make the choice on whether to support or reject the vote, indigenous Australians have:
- A life expectancy 8 years shorter than non-Indigenous Australians;
- Worse rates of disease and infant mortality; A suicide rate twice as high as non-Indigenous Australians.

How did the Australian government’s policies impact indigenous people

- Historical laws and policies, enacted by colonial settlers, marginalised indigenous communities, leading to **disparities in education and life expectancy.**
- The infamous **“Stolen Generation”** involved the **forced removal of indigenous children** from their families, causing **lasting trauma.**
- Recent legislative changes have aimed to address these injustices, **including voting rights in 1962 and acknowledgment of native title in 1992.**
- In 1997, the **“Bringing Them Home”** report shed light on the **Stolen Generation, prompting official apologies and recognition from the Australian government.**

Why then does the referendum appear likely to fail:

- For the **referendum to be passed, more than 50 per cent of voters must vote in favour nationally**, plus the majority of voters in the majority of Australian states.
- **Any constitutional alterations in Australia require a national referendum** in which **voting is compulsory for all adults.**
- Opposition parties like the **Liberal Party and the Nationals** have expressed **reservations about the referendum.**
- The **‘No’ campaign argues that the proposed body’s specifics, including member composition and powers, remain unclear.**
- Critics claim that a **‘Yes’ vote might deepen racial divisions** within Australian society.
- **Some Indigenous groups reject the proposed consultative body**, viewing it as toothless, and instead **advocate for a formal treaty to transfer substantial power** from the government to Indigenous people.



Topic 41. CENTRE SEEKS INCLUSION OF TRADITIONAL MEDICINE ON WHO'S LIST

Important for the subject: International Relations

The Union government has sought for **Ayurveda and related systems** to be **included** in the **11th revision** of the **World Health Organisation's International Classification of Diseases (ICD)**, as the **second module** of a supplementary chapter on traditional medicine conditions.

Module-2 of ICD:

- **Aim:** To put the Indian system of medicine on the world map and provide it with a common standardized language.
- The joint use of **ICD-11's chapter on traditional medicine** along with other chapters on **neoplasm, patient safety, and injuries**, can enhance the reporting of adverse events. It will enable the **integration of traditional medicine into insurance coverage and reimbursement systems**, in line with larger **WHO objectives** relating to **universal health coverage**.
- It will also link **traditional medicine practices** with **global conventional medicine's norms and standard development**.

To aid regulation, research:

- Ayurveda and related Indian traditional health care systems are formally recognised and widely practiced health care systems in India, which is making a strong and valid point for its inclusion.
- The **traditional medicine** chapter under **ICD-11** is a formative step for the integration of such forms of medicine into a classification standard used in conventional medicine.
- It also provides the means for doing **research and evaluation to establish its efficacy**.

National Ayush Morbidity and Standardized Terminologies Electronic (NAMASTE) portal:

- Comprehensive web-portal for Standardized Terminologies and National Morbidity Codes of Ayurveda, Siddha and Unani Systems of Medicine and WHO-ICD-10 and ICD-11.

Ayush Health Information Management System (A-HIMS):

- **A-HMIS** is a comprehensive IT platform to effectively manage **all functions of health care delivery systems and patient care in Ayush facilities**.
- It is the **first of its kind citizen centric service** from Government of India to provide **Electronic Health Record and Personal Health Record facility** to the recipients of Ayush Health Services catered through Research Councils, National



Institutes and other related agencies under Ministry of Ayush, Government of India.

International Classification of Diseases (ICD) of WHO:

- **ICD-11** came into effect from **January 2022**.
- It contains around **17,000 unique codes** and more than **1,20,000 codable terms**, which are now **entirely digital**.
- **ICD** provides a **common language** that allows **health professionals to share standardized information across the world**.
- The traditional medicine module of the **11th revision** provides a **list of diagnostics categories** to collect and report on traditional medicine conditions in a standardized and internationally comparable manner.
- **ICD-11** has facilitated the inclusion of **Module-1**, which covers **traditional medicine conditions originating in ancient China**, which are now commonly used in **China, Japan, Korea**, and elsewhere around the world.

Topic 42. RBI'S OPEN MARKET OPERATION PLAN

Important for the subject: Economy

RBI announces OMO plan, leaves markets surprised. RBI on October 6th announced its plan to consider the Open Market Operation (OMO) sale of government securities to manage liquidity in the system. (When government securities are sold by the RBI, liquidity is sucked out.)

- The move was not expected given that inflation is in the RBI's comfort band of $4 \pm 2\%$, and liquidity generally peaks around festival season.
- This in turn caused the yield on the benchmark 10-year government bonds to shoot up by 12 basis points to 7.34 per cent as the market now anticipates an OMO shortly.
- As the market expected bond supply to increase with the OMO, their prices fell (**price and rate on a bond are inversely related**). Alternatively in view of liquidity reducing after OMO, the interest rate on government bonds increased.

Why was the market surprised?

- The announcement took the **bond market** by surprise as the central bank did not reveal any specific timeline for the proposal.
- Though the retail inflation was at 6.83 per cent in August, the market was not expecting this measure from the RBI to suck out excess liquidity, adding a hawkish tint to the monetary policy.
- Liquidity is expected to tighten due to cash withdrawal from the banking system due to the forthcoming festival season.
- Historically, the October-May period is observed to have high cash withdrawals due to the festive and wedding seasons.
- With absence of any near term liquidity risk, when will OMO begin is open to speculation in the bond market.

What's OMO?



- The RBI uses Open market operations (OMOs) in order to adjust the rupee liquidity conditions in the market on a durable basis.
- When the Reserve Bank feels that there is excess liquidity in the market, it resorts to the sale of government securities, thereby sucking out the rupee liquidity.
- Similarly, when the liquidity conditions are tight, the central bank buys securities from the market, thereby releasing liquidity into the market. It's used as a tool to rein in inflation and money supply in the system.
- However, when liquidity is sucked out, it can lead to a spike in bond yields as the RBI will release more government securities into the market and bond buyers demand more interest rate on these securities.

Why is RBI going for OMO?

- RBI's objective of anchoring inflation at 4 per cent. But after having elevated inflation levels for much of the year, now RBI's approach is clear: merely keeping inflation below the upper band of the target range (at 6 per cent) is insufficient. RBI will try to bring the rate closer to 4%.

Topic 43. RELIEF TO EXPORTERS, SEZ AS GST COUNCIL MAKES CLARIFICATIONS

Important for the subject: Economy

RBI announces OMO plan, leaves markets surprised.

What was the problem with remittances to Vostro A/Cs?

Under the Goods and Services Tax (GST) regime, exports of goods or services are considered zero-rated supplies, which means they are exempt from GST.

- To qualify for GST refund, the supply of services an entity **need to qualify as export of services**.
- Exporters who receive payment through VOSTRO accounts were having difficulty in making refund claims, as the transactions were in Rupee and not forex.

Clarification on remittances in Vostro A/Cs:

- Remittances received in Vostro account to now qualify as export of services, ending disputes on GST refunds.
- GST Council clarified the **admissibility of export remittances received in the Special INR Vostro account**, as permitted by RBI, for the purpose of "**consideration of supply of services to qualify as export of services.**"
- Now exporters will find getting GST refunds easy due to clarity on the classification of remittances received in **special Rupee Vostro Accounts (SRVAs)**.



Clarification on claiming IGST for SEZ units:

- Till now there was ambiguity on the possibility of **claiming a refund of GST** paid on **supplies made by domestic suppliers** to SEZ.
- GST Council has now recommended amending the SEZ notification so as to **allow the suppliers to a Special Economic Zone** unit to claim the **refund of tax payment of integrated tax** made by them.

Vostro Accounts

- Rupee Vostro Accounts keep a foreign entity's holdings in an Indian bank in Indian rupees. When an Indian importer wants to make a payment to a foreign trader in rupees, the amount will be credited to this Vostro account.
- And when an Indian exporter needs to be paid for supplying goods or services, this Vostro account will be debited, and the amount will be credited to the exporter's account. As of the current date, Special Rupee Vostro accounts are permitted for 22 countries.
- Special Rupee Vostro Account (SRVA). The SRVA provides additional freedom compared to the ordinary VOSTRO accounts.
- The VOSTRO system also requires maintaining balances and position in preserve currencies like the US dollar and pound to facilitate trade. But SVRA allows balanced to be held exclusively in Rupee. RBI in July 2022 initiated the mechanism to settle international transactions in rupee to promote the growth of global trade, with emphasis on exports from India, as well as pushing rupee as an international currency. The move also helped sanction hit Russia.

Integrated GST

- Integrated GST or Integrated Goods and Services Tax is one of the four types of GSTs levied by the Central Government on interstate supply of goods and services.
- The revenue collected under IGST is apportioned equally between the Central and the State Governments (of the state where the goods/services are consumed).

Topic 44. WHY ARE MARKETS PANICKING OVER SURGING US BOND YIELDS

Important for the subject : Economy

US bonds in a downward trend with rising yields.

The US treasury bond market which had been in a bull market that peaked out in 2020, has now started to reverse aggressively.

The US 30-year bond which had a yield of around 9 per cent in 1988, had dipped to below 1 per cent in 2020 (**when yields decline bond prices go up**).

- In this intervening period the risk-free 30-year bond index had outperformed the stock market benchmark, S&P 500 total return.
- Now with the 30 year bond now yielding 4.96 per cent, it is now at levels last seen in



2007. So is the 10 year bond which is yielding 4.79 per cent.

What is causing the increase in yields?

Persistent inflation:

- With persistent inflation, investors believe the US is likely to have long-term inflation around 3 per cent, with changed structural dynamics in the global economy post covid.
- For holding bonds they want compensation for that inflation and a premium over that. Typically investors in 10-year yields may expect at least a 1.5 per cent premium over inflation. There is also a concern that the Fed's pause on rate hikes may be premature. And so if Central Banks don't do their job, the markets seems to be pricing the interest expectation for the Central Bank.

Large bond issuances:

- US fiscal deficit for FY23 (ending September) has doubled to two trillion from around one trillion in FY22. With the Fed too not doing quantitative easing (QE/buying bonds anymore), the flood of bond issuances to fund the spending has further altered the supply-demand landscape for bonds.

Global macro/geopolitical factors:

- China has been reducing its holdings of US bonds. This could be due to a combination of economic as well as geopolitical factors.
- Further, there are risks that Japanese holders of US treasury bonds (large holders) may unwind as bond yields in Japan increase making the US investment less attractive.
- Many economists are of the view that Japan's Central Bank may be forced to abandon its yield curve control and allow yields to move up as macro economic/inflationary pressures mount

Why are equity markets selling off?

- Higher risk free yields make risk assets less attractive.
- During covid-19 (CY20) when interest rates were so low and equities saw a bull run, as there were no alternative to equities. Now bonds are emerging as compelling alternatives to equities.

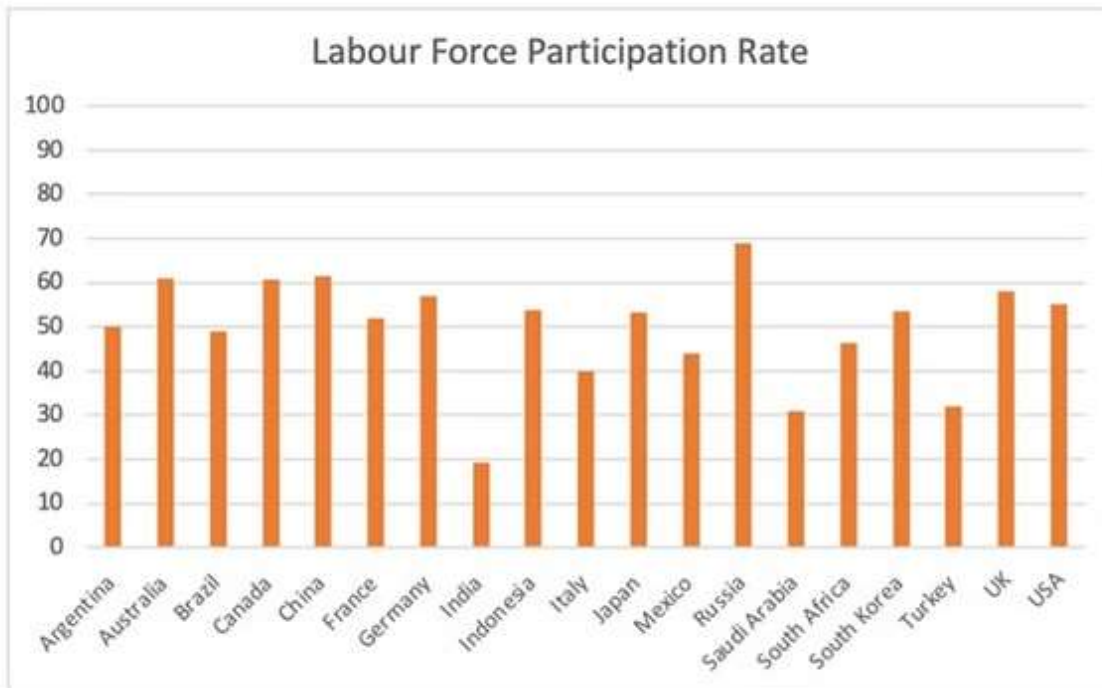
Possibilities of cooling of the US t-bond yields:

- Volatility in bond yields may lead to a credit event causing an abrupt slowdown in economy which will trigger rate cuts/QE by the US Fed.
- Another plausible path for cooling of yields is that the current levels of interest rates will slow down the economy enough or result in a mild recession next year, resulting in cooling of inflation. This will consequently result in cooling of bond yields as well.
- There is also a risk of stagflation where economy could be in recession, but inflation remains high like it happened in the 1970s in countries like US and UK.



Topic 45. ECONOMICS NOBEL PRIZE FOR WORK ON GENDER-BASED PAY GAP

Important for the subject: Economy



In News: Claudia Goldin wins Nobel economics prize for work on gender gap in the 2023 Nobel economics prize for her work on labour market inequalities based on gender.

Claudia Goldin has been awarded the prize for **exposing the causes of deeply rooted wage and labour market inequality between men and women.**

- Her work provided the first comprehensive account of women’s earnings and labour market
- Her research reveals the causes of change, as well as the main sources of the remaining gender gap. Her research reveals the causes of change, as well as the main sources of the remaining gender gap.
- There are still large differences between women and men in terms of what they do, how they’re remunerated and so on. Her work tries to answer why it is so.
- Her research found that married women started to work less after the arrival of industrialisation in the 1800s, but their employment picked up again in the 1900s as the service economy grew.
- Higher educational levels for women and the contraceptive pill accelerated change, but the gender pay gap remained.
- While historically that earnings difference between men and women could be blamed on educational choices made at a young age and career choices, Prof Goldin found that the

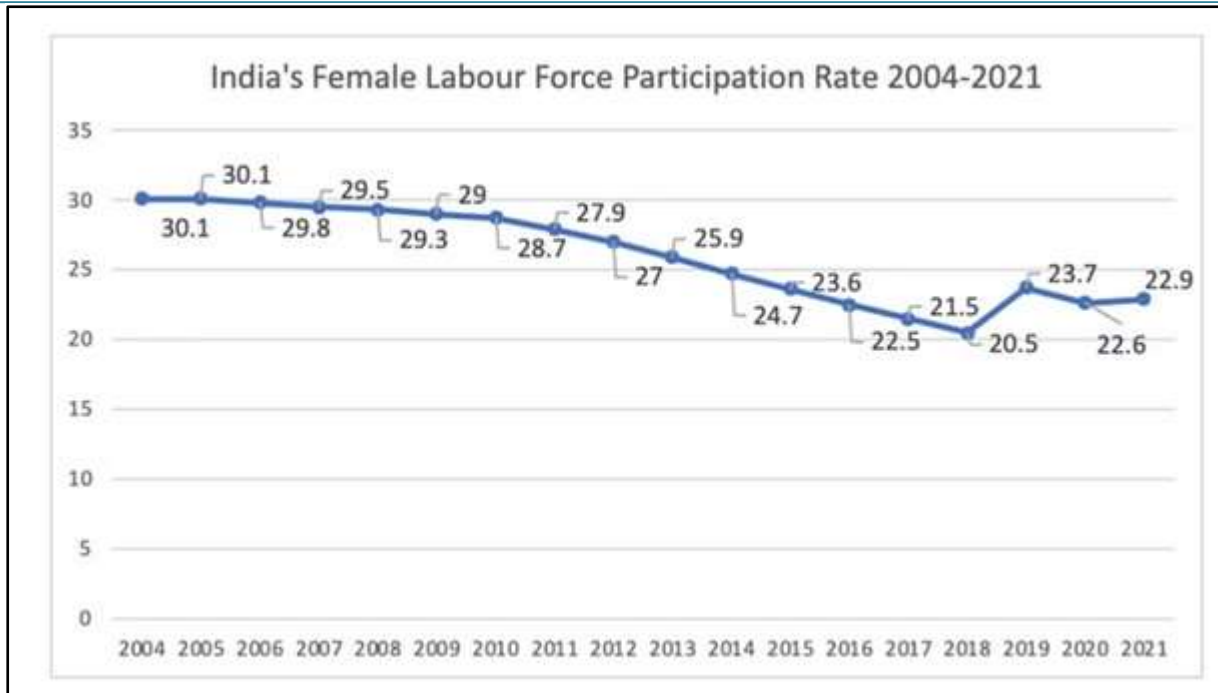


current earnings gap was now largely due to the impact of having children.

- Prof Goldin was the first woman to receive tenure in Harvard's economics department in 1989. Economics still had an image problem with women, she told the BBC in 2018.
- Even before students enter university, they believe economics is a field more oriented to finance and management and women are less interested in those than are men.
- If we explained economics was about "inequality, health, household behaviour, society, then there'd be a much greater balance," she said.
- The economics prize is different to the original prizes in physics, chemistry, physiology or medicine, literature and peace, which were established by Alfred Nobel and first awarded in 1901.
- The Sveriges Riksbank Prize in Economic Sciences was established in 1968 and funded by Sweden's central bank.
- Elinor Ostrom was the first woman to win the economics prize in 2009, which she was awarded jointly with Oliver E Williamson for research on economic governance.
- In 2019 Esther Duflo shared the award with her husband Abhijit Banerjee, and Michael Kremer, for work that focused on poor communities in India and Kenya.

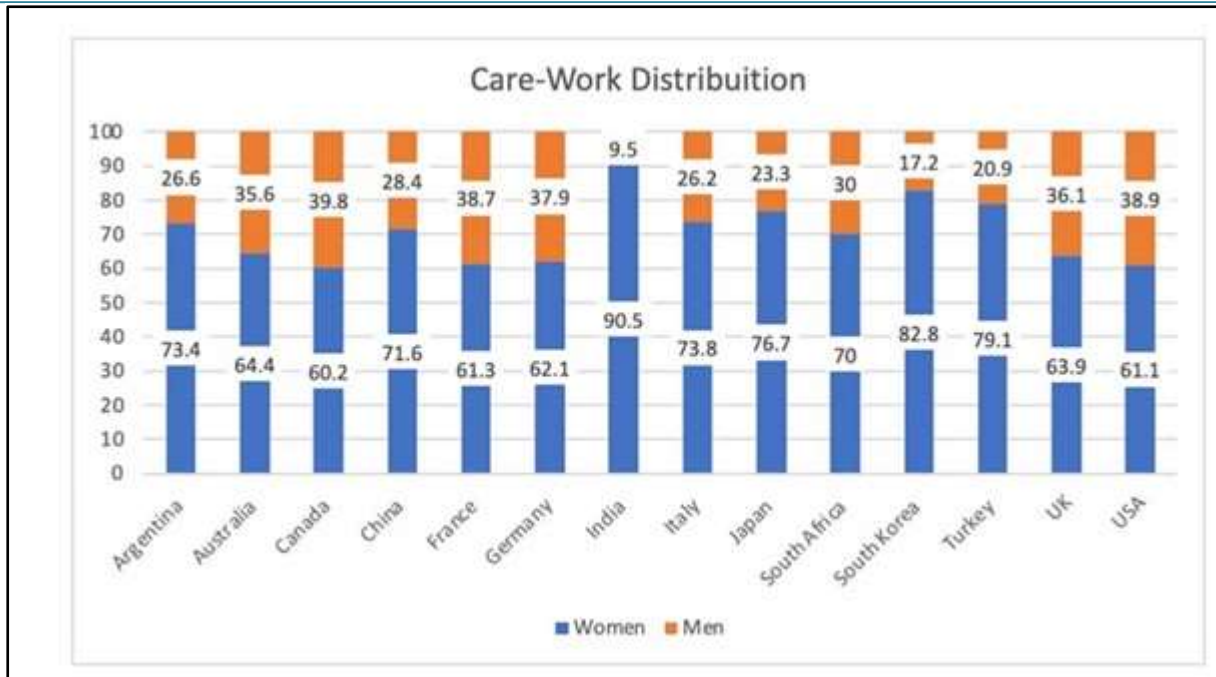
Reasons for pay gap:

- She has attributed the gap to factors ranging from outright discrimination
- Further she has attributed it to phenomena such as "**greedy work**", a term she coined for **jobs that pay disproportionately more per hour when someone works longer or has less control over those hours**, effectively penalising women who need to seek flexible hours.
- Only two women have previously landed the economics prize: Elinor Ostrom in 2009 and Esther Duflo.
- Goldin, is only the third woman to win the Nobel economics prize and the first to win it by herself rather than sharing it.
- India's FLFPR is one of the lowest in the world and the lowest among the G20 countries at 19.23% .
- India's FLFPR is one of the lowest in the world and the lowest in the G20 countries at 19.23% as per the World Economic Forum's Global Gender Gap Report 2022. In contrast, the average FLFPR for the G20 cohort lies at 49.78%.
- India's low FLFPR is unprecedented, considering many usual and unusual factors that keep women from the organised-formal workforce, despite knowing the fact, based on recent NFHS data, that a 'high fertility ratio' and 'low education rates', are no longer a cause for concern or a deterrent for women's ability to be part of the organised workforce. The country has seen a reduction in fertility from **0 to 2.5 children per woman as per recent data**.
- Additionally, India has also seen a rise in girls' enrolment in primary education and has **seen female enrolment, for women aged 15-24**, in any educational institution, go from **1% to 36% (ILO 2014)**. The change in these factors in the recent decades should correlate to an increase in FLFPR.
- However, the opposite is true. As per **World Bank estimates, in 2004**, India's FLFPR was **2% which fell to 22.9% in 2021**. World Economic Forum pegs **India's FLFPR** even lower at **19.23% in 2022**, in their **Global Gender Gap Report 2022**.



The Reasons Behind India's Low FLFPR

- The major contributor towards **India's low FLFPR** can be traced to women's contributions towards **care work at home**. Indian women are responsible for most of the **unpaid domestic work in the houses**, may it be towards the maintenance of households or taking **care of dependent family members**.
- According to the **International Labour Organisation**, Indian women contribute **297 minutes a day towards care work**, while men contribute **29 minutes the same**. This implies women shoulder the burden of **90.5% of the care work**, while only **9.5%** is cared for by men.
- Furthermore, while on average, even in other **G20 countries**, women shoulder most of the burden of care work, the distribution of responsibilities is not as skewed. On average, women in other **G20 countries account for 70.77% of the care work**.



- When it comes to care work distribution, countries in Europe (except Italy), the United Kingdom, the United States, and Canada are the most favourable performers, averaging around 61% of unpaid care work being performed by women.
- These countries perform better in this criterion, because their governments choose to invest in social care. Whereas in developing countries, like India, the burden falls heavily on women. This implies that the time that that could be utilised for formal wage-earning labour, they spend on caring for their families, for which they accrue no compensation.
- What is interesting is that even when domestic work is outsourced, and domestic help is hired, women are still responsible for ensuring the quality of care. Additionally, even when households hire domestic labour, women of the household find themselves contributing to another form of unpaid care work, rather than joining the workforce.
- An ILO-IIHS study on India’s metropolitan cities of Bengaluru and Chennai found that 40% of households hire domestic work to free up time for care for elders and children and 30% of households hire for alleviating the burden of housework. It was found that in only 8.5% of households in Chennai, and 13.5% of households in Bengaluru, domestic help is hired to free up time for paid employment.

Some Recommendations for India

The recommendation for India is to work towards increasing **enrolment in higher education for women, enhance opportunities for women across different sectors, develop a robust care infrastructure, and increase access to financial resources for women entrepreneurs through direct fiscal interventions** i.e. single window clearances, tax breaks, and other measures that can help directly promote women entrepreneurship in the country



Topic 46. RBI EXTENDS PCA FRAMEWORK TO GOVERNMENT NBFCs

Important for the subject: Economy

The Reserve Bank of India (RBI) has extended the Prompt Corrective Action (PCA) framework for Non-Banking Financial Companies (NBFCs) to government NBFCs starting from October 1, 2024.

Background:

- The PCA Framework for NBFCs was introduced by the RBI on December 14, 2021. The framework aims to address financial risks and safeguard the health of NBFCs.
- Prior to this extension, the PCA framework was in place for Scheduled Commercial Banks since 2002.

About Prompt Corrective Action (PCA):

- PCA is a structured framework established by the Reserve Bank of India (RBI) to monitor and intervene in banks with weak financial metrics.

Objective:

- The primary aim of PCA is **to address issues related to undercapitalization, poor asset quality, and declining profitability in banks.**
- It focuses on **tackling the problem of Non-Performing Assets (NPAs)** in the Indian banking sector.
- The PCA framework **enables supervisory intervention when necessary** and compels the supervised entity to implement corrective actions promptly to **restore its financial health.**
- It serves as a **tool for maintaining market discipline** within the financial sector.
- This extension of the PCA framework to government NBFCs aligns with the RBI's efforts to **ensure the stability and soundness of financial institutions** in India.

History:

- The **RBI introduced the PCA framework in 2002** as a mechanism for early **intervention** when banks face financial stress.
- It was reviewed in 2017 based on the recommendations of the **working group of the Financial Stability and Development Council on Resolution Regimes for Financial Institutions** in India and the **Financial Sector Legislative Reforms Commission.**

Role:

- PCA serves as an **alert system for regulators, investors, and depositors** to recognize potential banking troubles in advance.
- It enables the **RBI to monitor key performance indicators of banks** and take corrective actions to restore a bank's financial health.

PCA Framework Criteria:

- Banks are classified as risky **if they trigger certain thresholds.** The key triggers include:



- **Capital to Risk-Weighted Assets Ratio (CRAR).**
- **Net Non-Performing Assets (NPA).**
- **Return on Assets (ROA).**
- **Tier 1 Leverage Ratio.**

Function:

- The PCA framework **helps the RBI track and assess the performance of banks** in relation to these trigger points.
- If a bank's financial indicators breach these thresholds, the **PCA framework outlines corrective measures to be taken to prevent the situation from deteriorating.**

Need for PCA Framework:

- The PCA framework was introduced in response to the collapse of major finance firms like IL&FS, DHFL, SREI, and Reliance Capital, which had collected public funds through fixed deposits and non-convertible debentures. These firms owed over Rs 1 lakh crore to investors.

Impact of PCA Invocation:

- When PCA is invoked for an NBFC, the RBI may enforce mandatory corrective actions, such as:
- Restrictions on dividend distribution and remittance of profits.
- Requiring promoters or shareholders to infuse equity.
- Reducing leverage.
- Limiting branch expansion.
- Imposing capital expenditure constraints (except for technological upgrades within board-approved limits).
- Restricting or directly reducing variable operating costs.
- For Core Investment Companies (CICs), the RBI may also restrict the issuance of guarantees or the assumption of other contingent liabilities on behalf of group companies.

About Capital to Risk-Weighted Asset Ratio (CRAR):**Definition:**

- CRAR is a financial ratio used to **measure a bank's capital in relation to its risk exposure.**
- It **indicates the amount of capital a bank holds as a buffer to cover potential losses** on its loans and other assets.

Calculation:

- The CRAR ratio is calculated by **dividing a bank's capital (Tier 1 and Tier 2 capital) by its risk-weighted assets.**
- $CRAR = (\text{Tier 1 Capital} + \text{Tier 2 Capital}) / \text{Risk-Weighted Assets}.$

Components of Capital:

- Tier 1 Capital (Core Capital): This includes **equity capital, ordinary share capital, intangible assets, and audited revenue reserves.**



- Tier 2 Capital: This comprises **unaudited retained earnings, unaudited reserves, and general loss reserves.**

Importance of CRAR:

- CRAR is a critical tool for assessing a bank's financial health.
- It ensures that **banks have sufficient capital to absorb potential losses and continue lending safely.**
- It **protects depositors and provides assurance** of a bank's ability to sustain its operations.

Benefits of CRAR:

- **Risk Management:** CRAR helps banks manage and mitigate risks effectively.
- **Depositor Protection:** It safeguards depositors' funds by ensuring banks have enough capital to cover losses.
- **Sustainability:** It contributes to the stability and sustainability of banks' operations.
- **Lending Capacity:** **Maintaining a healthy CRAR allows banks to continue lending money to businesses and individuals.**
- In summary, CRAR is a key financial metric that provides insights into a bank's financial strength and its ability to withstand financial challenges and risks.

Core Investment Companies (CICs) – A Quick Overview

- **Specialized NBFCs:** CICs are specialized Non-Banking Financial Companies (NBFCs) with a specific focus.
- **Asset Size Requirement:** To be registered with the RBI as a CIC, **a company needs to have an asset size exceeding Rs 100 crore.**
- **Primary Business:** The main business of CICs is the **acquisition of shares and securities.** However, specific conditions apply to their investment portfolio.
- **Investment Conditions:** CICs are required to have at least 90% of their net assets invested in equity shares, preference shares, bonds, debentures, debt, or loans in group companies.
- **Group Companies:** Group companies are defined as entities related through various relationships such as **subsidiaries, joint ventures, associates, promoter-promotee relationships (for listed companies), related parties, common brand names, and investments in equity shares of 20% and above.**
- In summary, **Core Investment Companies are specialized NBFCs with a significant asset size that primarily engage in acquiring shares and securities, Important for the subject to specific investment conditions primarily related to group companies.**



Topic 47. PERSONAL INCOME TAX VS. CORPORATE INCOME TAX COLLECTION

Important for the subject: Economy

Why in news?

Discrepancy in Growth Rates: Recent data from the Central Board of Direct Taxes (CBDT) indicates that personal income tax (PIT) collections have been growing more than twice as fast as corporate income tax (CIT) collections.

Impressive Growth in Direct Tax Collection: As of October 9, gross direct tax collection crossed ₹11 lakh crore, showing an 18% growth. After accounting for refunds, net direct tax collection amounted to ₹9.57 lakh crore, nearly 22% higher than the previous fiscal.

- **Differential Growth:** During this period, net CIT grew by over 12%, while net PIT, which includes Securities Transaction Tax, recorded a growth of around 32%.
- **Factors Behind Growth:** The CBDT attributes this growth in tax collection to three main factors: **technological advancements, increased disclosures in returns, and the addition of around 53 lakh new taxpayers in FY23.**
- **Positive Outlook:** With collections exceeding 50%, the CBDT expects further acceleration in growth. **The government aims to surpass the budget estimates by collecting over ₹18.23 lakh crore in FY24, which requires a 10.5% growth over the Revised Estimate of ₹16.5 lakh crore in FY23.**
- **Resolution for Stuck Refunds:** Regarding pending refunds, the **CBDT has initiated a demand management facilitation system to address cases where refunds are held up for various reasons, including old demands dating back to 2010-11.**
- **Statistics on ITRs:** For the assessment year 2023-24, **a total of 7.27 crore Income Tax Returns (ITRs) were filed**, with 7.15 crore verified by taxpayers. Out of these, the CBDT has processed 6.80 crore returns.
- In summary, **personal income tax collections have shown robust growth compared to corporate income tax collections.**

Type of Taxes in India – Direct and Indirect Taxes

- The types of taxes in India can be categorized into two main categories:
- **Direct Tax:** This tax is levied directly on individuals or entities and cannot be transferred to another party. Examples of direct taxes include:
 - **Income Tax:** Applied to the **income earned by individuals**. The tax rates are structured into slabs based on income levels, and higher income corresponds to higher tax liability.
 - **Corporate Tax:** **Applicable to the profits earned by companies** from their business



operations.

- **Indirect Tax:** Indirect taxes are **imposed on the consumption of goods and services** rather than directly on income or profit. These taxes can be passed on from one party to another.
- **With the introduction of the Goods and Services Tax (GST) in India from July 1, 2017**, various indirect taxes have been replaced. These include:
 - **Service Tax:** Applied to certain services.
 - **Sales Tax:** Imposed on the sale of goods.
 - **Value-Added Tax (VAT):** Levied at each stage of production and distribution.
 - **Central Excise Duty:** A tax on the manufacturing or production of goods.
 - **Customs Duty:** Applied on the import or export of goods.
- **The GST regime has unified and simplified the taxation system by replacing multiple indirect taxes** with different tax slabs for different items. It is important to note that **indirect taxes can be shifted from one party to another in the supply chain, which can have an impact on the final consumer.**
- The Indian government has introduced several significant taxation-related reforms in recent times, which encompass both direct and indirect taxes. Here is a summary of these reforms:

Taxation Reforms in India

Indirect Tax Reforms:

- **Goods and Services Tax (GST):** The **implementation of GST involved the integration of state and central indirect taxes, leading to the abolition of entry tax and Central Sales Tax (CST)**. This move streamlined taxation and reduced trip times on major road corridors, benefiting manufacturers.

Direct Tax Reforms:

- **Corporate Tax Rate Reduction:** The government introduced a historic tax reform through the Taxation Laws (Amendment) Ordinance 2019. It **offered a concessional tax rate of 22% for all existing domestic companies from FY 2019-20 if they did not avail specified exemptions or incentives**. These companies were also exempted from paying Minimum Alternate Tax (MAT).
- **Reduction in MAT Rate:** The rate of Minimum Alternate Tax (MAT) was **reduced from 18.5% to 15%, offering relief to companies** that continue to avail exemptions or deductions.
- **Exemption from Income Tax:** The Finance Act, 2019, provided 100% tax rebate to individuals earning taxable income up to Rs. 5 lakh. **Additionally, the standard deduction for salaried taxpayers was increased from Rs. 40,000 to Rs. 50,000.**
- **Vivad se Vishwas:** The **Direct Tax Vivad se Vishwas Act, 2020**, was enacted to provide



- a resolution for pending tax disputes, benefiting both the government and taxpayers.
- **Faceless E-assessment and Faceless Appeals:** These initiatives, introduced in 2019 and 2020, respectively, **aimed to eliminate human interface, optimize resources, and enhance efficiency in assessments and appeals.**
 - **Simplification of Compliance Norms for Start-ups:** Start-ups were provided with simplified assessment procedures, **exemptions from Angel Tax, and the establishment of dedicated start-up cells.**
 - These reforms are aimed at streamlining the taxation system, promoting economic growth, and simplifying compliance for taxpayers.

Topic 48. PRINCIPLE OF COMPARATIVE ADVANTAGE

Important for the subject: Economy

Indian Industrial Policy doesn't take into account India's comparative advantage

- What is **Comparative advantage**?
- According to the principle of comparative advantage, the gains from trade follow from allowing an economy to specialise. If a country is relatively better at making wine than wool, it makes sense to put more resources into wine, and to export some of the wine to pay for imports of wool.
- This is even true if that country is the world's best wool producer, since the country will have more of both wool and wine than it would have without trade.
- A country does not have to be best at anything to gain from trade. The gains follow from specializing in those activities which, at world prices, the country is relatively better at, even though it may not have an absolute advantage in them.
- Because it is relative advantage that matters, it is meaningless to say a country has a comparative advantage in nothing. The term is one of the most misunderstood ideas in economics, and is often wrongly assumed to mean an absolute advantage compared with other countries.
- India has comparative advantage in **labour intensive industry** but the industrial policy favours **capital-intensive industry**.

Topic 49. G20'S ROADMAP FOR CRYPTO REGULATION

Important for the subject: Economy

Adoption of the G20 Roadmap on Crypto Assets: Under India's Presidency, the Finance Ministers and Central Bank Governors of the G20 nations have **adopted a comprehensive roadmap for the regulation of crypto-assets**, as proposed by the IMF and FSB.

Preferential Regulatory Oversight: Rather than supporting a blanket ban, the roadmap emphasizes the **necessity of comprehensive regulatory and supervisory oversight to**



ensure macroeconomic and financial stability.

- **Implementation of FATF Standards:** The roadmap advocates the implementation of Financial Action Task Force (FATF) anti-money laundering and counter-terrorist financing (AML/CFT) standards to mitigate potential risks associated with the misuse of crypto-assets for criminal or terrorist activities.
- **Special Considerations for Emerging Economies:** The synthesis paper recommends that emerging economies, in particular, take additional targeted measures to address specific risks that they may face. These measures should be adapted based on the unique circumstances and capacity constraints of each jurisdiction.
- **Volatility and Market Trends:** Crypto assets have exhibited significant volatility, with several episodes of sharp appreciation and subsequent steep price reversions. For instance, in 2021, the total market value of crypto-assets experienced substantial growth but subsequently faced a significant downturn in 2022. The G20's emphasis on regulatory oversight and compliance with AML/CFT standards signifies a concerted effort to address potential risks associated with crypto-assets and ensure financial stability on a global scale.

IMF and FSB Paper Recommendations:

- The IMF and FSB highlight the challenges associated with banning cryptocurrencies, emphasizing the importance of regulatory oversight and compliance with anti-money laundering standards. They advocate for monitoring licensed crypto-asset issuers and service providers to bridge information gaps and ensure effective oversight of cross-border crypto activities.

What is Cryptocurrency?

- Cryptocurrency is a digital or virtual form of currency that operates on decentralized blockchain technology, utilizing cryptography for security. It is not regulated by any central authority and often exhibits high price volatility.

What are the difference from Central Bank Currencies:

- Unlike central bank currencies, cryptocurrencies are not issued or governed by a central authority such as a government or central bank. They are decentralized, globally accessible, and typically have a limited supply, making them immune to government manipulation.

Regulatory Framework in India:

- The regulatory environment in India has experienced various shifts, including a ban on cryptocurrency transactions by the Reserve Bank of India (RBI) in 2018, subsequently overturned by the Supreme Court in 2020. In the 2022-23 Union budget, India proposed a 30% tax framework for cryptocurrency-related income



and transactions.

G20's Endorsement:

- The G20 Leaders Declaration has endorsed the FSB's recommendations and welcomed the paper's roadmap for a comprehensive policy and regulatory framework concerning cryptocurrencies.

About FSB

- The Financial Stability Board (FSB) is an international organization established in 2009 that monitors and provides recommendations on global financial systems, succeeding the Financial Stability Forum. Its headquarters are in Basel, Switzerland.

About Central Bank Digital Currency (CBDC)

- A Central Bank Digital Currency (CBDC) is a digital form of a country's fiat currency that is issued and regulated by the country's central bank.
- It operates as a legal tender and is designed to provide a secure and efficient medium of exchange, aiming to offer an alternative to physical cash and other forms of digital payments. The CBDC is managed and supervised by the central bank, ensuring its stability and reliability.
- The introduction of CBDCs by central banks is often seen as a response to the growing demand for digital currencies and the increasing adoption of digital payment systems in the modern financial landscape.
- By offering a digital alternative to physical cash, central banks aim to provide a secure and convenient means of digital transactions while maintaining the stability and credibility of the national currency.

OECD's Crypto-Assets Reporting Framework (CARF)

- Establishment of a framework for cross-border reporting and exchange of information on crypto assets.
- Aims to address the borderless nature of crypto assets, emphasizing the need for international collaboration in regulation and prevention of misuse.

Anticipated Benefits of CARF Implementation:



- **Enforcement of reporting obligations for entities and individuals** involved in crypto asset services.
- **Promotion of a standardized regulatory environment for crypto asset usage** and investments globally.

Impact on India:

- CARF introduction could **facilitate the development of a comprehensive taxation and regulatory structure** for crypto assets in India.
- Enables India to **establish a robust and standardized approach to managing crypto assets within its financial ecosystem**.

About OECD:

- Formed as the **Organisation for European Economic Co-operation (OEEC) in 1948**.

Renamed the OECD in 1961 with the inclusion of the USA and Canada.

- Focuses on **promoting economic stability and combating poverty** through economic development and cooperation.
- **India, although not an OECD member**, has been engaged in a cooperation program with the organization since 1997.

Topic 50. RISING RISK OF UNSECURED RETAIL LOANS IN INDIA

Important for the subject: Economy

Increasing Risk: UBS highlights the **growing risk of unsecured retail loans turning bad** in Indian banks as lending to borrowers with overdue debt has risen.

Pandemic Impact: The **stress on household finances due to the pandemic has eased, leading to a boost in unsecured lending portfolios** by lenders in the country.

- **Regulatory Scrutiny:** The Reserve Bank of India (RBI) has indicated its **close monitoring of the segment for early signs of stress**, reflecting the significance of the issue. **UBS's Observations:** UBS has conducted a study, which indicates a **rise in the share of loans to borrowers with weaker risk profiles** and increased leverage among retail borrowers.
- **Data Insights:** Central bank data shows a significant **increase in outstanding receipts from credit cards and personal loans**, further emphasizing the rapid growth in unsecured lending.
- **Changing Metrics:** The share of lending to borrowers with **overdue loans and the number of borrowers with multiple retail loans has notably increased** over the past few fiscal years, signaling potential risks.
- **Impact on Bank Ratings:** UBS has downgraded its rating on State Bank of India and Axis Bank, citing **rising credit costs** as the reason for the change.
- **Unsecured Loan Proportions:** Unsecured loans as a percentage of total loans have risen for banks like SBI and Axis Bank, further underscoring the potential



vulnerability in their lending portfolios.

Status of Unsecured Loans:

- Unsecured loans reached from **5 lakh crore in April 2019 to 11.1 lakh crore in April 2023.**
- **Banks turned to retail loans due to defaults on project loans**, leading to rapid growth in unsecured credit card debt and personal loans.
- **Unsecured loans are growing at a rate of 30-31% annually, outpacing overall system credit growth of 8-9%.** Despite constituting less than 8% of outstanding bank credit, **unsecured retail loans are growing faster, warranting attention from risk managers and regulators.**

Concerns and Significance:

- Past experiences highlight **challenges in recovering loans in case of defaults.**
- Unsecured loans are crucial for sustaining India's consumption momentum and showcasing robust credit growth for banks.
- **Improved data quality and technical interventions have facilitated better monitoring of retail borrowers and loan extension to prime candidates.**
- Intense competition among lenders catering to the same segment **may dilute credit standards, resulting in poor risk pricing and potential negative outcomes.**

Recommended Actions:

- Public sector banks should **prioritize technology adoption and strengthen alternative credit scoring and data analytics.**
- Indirect acquisition of retail exposures **through securitization or assignment deals with NBFCs or small finance banks** can help manage risks effectively.
- Niche lenders should exercise caution **due to their vulnerability to liquidity risks and external shocks**, necessitating conservative exposure limits for unsecured retail loans.

Topic 51. MORE CLIMATE CHANGE VARIABLES NEEDED IN 16TH FINANCE COMMISSION'S TAX DISTRIBUTION FORMULA, SAY EXPERTS

Important for the subject: Polity

The **16th Finance Commission** which will be **constituted in November** will give a formula for **tax distribution among states** for the period **2026 to 2031.**

- The **formula-based finance commission transfers** are **unconditional** and are not tied to the department of Forest or Ecology.
- The **last two Finance Commissions (14 & 15th)** focused **solely on forest cover** within the **climate change criterion** that was incorporated into the **Terms of Reference (TOR)** for the **13th FC**. Some of the other variables that may be considered are: Biodiversity, Ecosystem services etc. among others.

Need for including more variables:

- It could increase the incentive to protect and restore forests or direct conservation toward



certain types of forests.

Global practices of environmental fund allocation:

- **The Brazilian state of Para** allocates funds based on deforestation reduction.
- The **Brazilian state of Tocantins** and the **Indonesian province of North Kalimantan** allocate funds based on **forest fire control**.

Concerns in including more variables:

- Adding other factors may make the formula complex and tough to measure. There is a possibility that monoculture is promoted as forest.
- Whether **ecological variables**, such as **forest cover**, in the **tax distribution formula under the Finance Commissions**, have any impact on the environment and its conservation in the states, is, as yet, unclear.
- The environmental funds allocation from FC is **unconditional** meaning it is not clear whether they are being used for environmental purposes or not.
- Since **2005**, the **central government** has been **sharing annual forest grants to states** which are intended both as compensation mechanisms and incentive mechanisms, it remains unclear how much the grants for forests have contributed to increased forest cover in the states.

Some studies indicates:

- **No significant change in the state's forestry budget** despite the fact that they **received incentives** (through EFT) for maintaining land under forest.
- States with high forest cover experienced a loss of forested acreage, while states with lower initial cover gained forested land. States receiving a larger share of compensatory funds through CAMPA had a higher percentage of forest land diverted to non-forest lands.

Finance Commission:

- The **Finance Commission** is a **Constitutionally mandated body** that is at the center of fiscal federalism. Set up under **Article 280** of the Constitution, its **core responsibility** is to evaluate the state of finances of the Union and State Governments, recommend the sharing of taxes between them, lay down the principles determining the distribution of these taxes among States.

Finance commission's tax devolution formula:

- The **Finance Commission's formulae for tax sharing** have **evolved since the first one**, constituted in **1951**, for the period **1952-1957**.
- Since then, **FCs** have been constituted at intervals of every **five years** with the **15th** one currently being implemented and the **16th FC**, to be constituted in **November** and applicable starting next year.

Tax devolution:

- States' share at **41 percent of the divisible pool** comes to **42.2 lakh crore** for **2021-26 period**.
- Based on principles of **need, equity and performance**, the overall devolution formula is as follows:



Criteria	Weight (%)
Population	15.0
Area	15.0
Forest & ecology	10.0
Income distance	45.0
Tax & fiscal efforts	2.5
Demographic performance	12.5
Total	100

Changes in horizontal devolution:

- The formula for distributing tax among states respectively is known as **horizontal devolution**.
- 7th FC drastically reduced the weightage of ‘**Population**’ criteria from **80-90%** to **25%**, and **increased the weightage** of other indicators related to **equity**, in which **income, land area, and sometimes infrastructure and fiscal discipline** are also considered.

Changes in determining the funds allocation for environmental initiatives:

- The **12th and 13th FCs** (covered the period from **2005 to 2015**) gave **specific-purpose grants to states**, for **forestry**, amounting to **Rs. 10 billion** and **Rs. 50 billion**, respectively but these grants comprised **less than 0.05%** of the total funds transferred from the central government to the states.

Ecological Fiscal Transfers (EFT):

- Introduced in **2015**. Under the EFT public revenue is shared based on **ecological indicators**.
- The **14th FC** incorporated **forest cover** as a **criterion for tax devolution**, allocating it a **weightage of 7.5%** in the distribution formula for the tax transfer during the period **2015-16 to 2019-2020**. The **15th FC** retained the **variable of forest cover for tax distribution, increasing** the weightage to **10%**.
- **EFT** has significantly increased globally, from **\$0.35 billion** in **2007** to **\$23 billion** in **2020**, spanning countries like **Brazil, Portugal, France, China, and India**.
- EFT had not led to a noticeable increase in forest cover or state forestry budgets



Topic 52. MANIPUR BJP LEADERS HAVE THE DOUBT WHETHER THERE IS ARTICLE 355 IN STATE

Important for the subject: Polity

Manipur BJP leaders have the doubt whether there is Art 355 in state. The **Chief Minister of Manipur, N. Biren Singh**, faced public outrage as mobs tried to storm his residence.

Senior Manipur BJP members **wrote to the national BJP president, expressing concern over public anger** and the government's perceived failure and called for the **revocation of Article 355 and restoration of Unified Command control** to regain public trust.

- Despite **denials by the Union government**, the situation hints at external interference in the state's affairs, exacerbating the **divide between the valley and hill districts**.
- The **opposition and civil society organizations also question the state government's efficacy**.

What is Article 355:

- It is a **part of emergency provisions** contained in **Part XVIII** of the Constitution of India, from **Article 352 to 360**. It **empowers the central government** to take all necessary steps to protect a state against **internal disturbances and external aggression**.
- This article **empowers the Centre to take necessary steps to protect a state from any kind of threat, be it internal or external**.
- The provision is **designed to ensure that the government can act swiftly and decisively** in the event of any disturbance or threat to the peace and security of the country.
- The **exact definition** of Article 355 is **"It shall be the duty of the Union to protect every State against external aggression and internal disturbance and to ensure that the government of every State is carried on in accordance with the provisions of this Constitution."**
- **Article 355**, as it currently exists, was **not in the 1948 draft constitution**, and was only **added in September 1949 as draft Article 277A**.
- It was **inserted** with the objective of providing a **legitimate ground for the application of Article 356** of the constitution, which **allows the Union government to issue a proclamation of President's Rule** in a specific state.

What is the difference between Article 356 and Article 355

- **Article 356** empowers the **President to impose President's Rule** in a state in case of a failure or breakdown of constitutional machinery, while **Article 355 empowers the Union government to protect every state in India against external aggression and internal disturbances and issue directions to any state to ensure compliance with the Union's laws and regulations**.



Topic 53. A DAY AFTER ALLOWING TERMINATION OF 25-WEEK-OLD PREGNANCY, SUPREME COURT PUTS ABORTION ON HOLD

Important for the subject :Polity

A day after allowing termination of 25-week-old pregnancy, Supreme Court puts abortion on hold.

The Supreme Court of India has asked the All India Institute of Medical Sciences authorities to temporarily halt a woman's 25-week pregnancy termination, one day after permitting the procedure.

- AIIMS doctors raised concerns about the fetus being currently viable, indicating a strong possibility of survival.
- They inquired whether a feticide procedure, stopping the fetal heart, can be performed before termination.
- The doctors emphasized the potential challenges and consequences of a preterm delivery, including the child's quality of life, and the need for clear adoption procedures.
- The Supreme Court has requested the Centre to file a formal application for the recall of the previous order.

What are the abortion law in India:

- Abortion was initially illegal in India, resulting in imprisonment or fines under Section 312 of the Indian Penal Code.
- To address this, the Shantilal Shah Committee was formed in the 1964. to assess the necessity of abortion regulations.
- This led to the introduction of the Medical Termination of Pregnancy (MTP) Act in 1971, legalizing and regulating abortions.
- Now abortions in India are regulated by the Medical Termination of Pregnancy (MTP) Act, 1971.

Under the law section 3 of the MTP Act 1971, the doctor can perform an abortion in the following conditions:

- If the pregnancy would be harmful to the life of the patient or affects her physical or mental health. The doctor will need to consider the circumstances of the patient to figure out if the pregnancy will harm her mental health, on a case to case basis.
- If there is a good chance that the child would suffer from physical or mental abnormalities which would leave him or her seriously handicapped.
- If pregnancy occurred as a result of a failure of contraception only applicable to married women.
- If pregnancy is a result of sexual assault or rape.

Condition for termination of pregnancy:



- If the **pregnancy has not exceeded 12 weeks, only one doctor is needed to sign-off**. If the **pregnancy has exceeded 12 weeks and is below 24 weeks, two doctors** are needed.
- The **gestation period does not matter** if a doctor feels that an **immediate abortion must be conducted** to save the life of the patient.
- The doctor who determines if it is necessary to perform an abortion and performs it needs to be a **‘registered medical practitioner’** under the law.
- In **January 2020**, the Union Cabinet approved **amendments to the MTP Act**, allowing women to seek abortions as **part of reproductive rights** and gender justice.
- The amendment **raised the upper limit of MTP from 20 weeks to 24 weeks** for women including **rape survivors, victims of incest, differently-abled women and minors**.

Topic 54. CENTRE OPPOSES CPR PETITION TO ALLOW USING PART OF FUND IN FD

Important for the subject : Polity

Centre opposes CPR petition to allow using part of funds in FD

More about the news:

The government expressed its **disagreement** with the **Centre for Policy Research (CPR)** understanding of the **release of 25% of funds** that were **not used concerning fixed deposits**.

This disagreement **arose during a hearing at the Delhi High Court** where CPR challenged the suspension of its registration certificate **under the Foreign Contribution Regulation Act (FCRA)**.

- The **Ministry of Home Affairs** had frozen CPRs accounts following a suspension order.
- The **main point of contention revolves around how “in his custody” is interpreted in Section 13(2)(b) of FCRA**.
- **CPR argues that this includes funds** that one has control or dominion over, like fixed deposits.
- On the other hand, the **government maintains that fixed deposits should not be considered as amounts**.

What is FCRA:

- The law sought to regulate **foreign donations to individuals and associations** so that they functioned in a manner consistent with the values of a sovereign democratic republic.
- The law was **enacted during the Emergency in 1976** amid apprehension that foreign powers were interfering in India’s affairs by pumping in funds through independent organizations.
- It is implemented by the **Union Home Ministry**

**What are the provisions of the act:**

- The FCRA requires every person or NGO seeking to receive foreign donations to be

To be registered under the Act

- To **open a bank account** for the receipt of the foreign funds in **State Bank of India, Delhi**
- To **utilize those funds only for the purpose for which they have been received** and as stipulated in the Act
- To **file annual returns and not to transfer the funds to another NGO**

How is FCRA registration granted:

- FCRA registrations are **granted to individuals** or associations that have **definite cultural, economic, educational, religious, and social programmes**.
- NGOs that want to receive foreign funds **must apply online with the required documentation**.
- **Authority**– The **Ministry of Home Affairs** makes inquiries through the **Intelligence Bureau into the antecedents** of the applicant and approves or rejects the application **within 90 days**.
- In case of failure to process the application in the given time, the **MHA is expected to inform the NGO of the reasons for the same**.

Eligibility- Under the FCRA, the applicant

- Should **not be fictitious or benami**
- Should **not have been prosecuted or convicted** for indulging in activities aimed at conversion through inducement or force, **either directly or indirectly, from one religious faith to another**
- Should not have been **prosecuted for or convicted of creating communal tension or disharmony**
- Should not have been **found guilty of diversion or misutilisation** of funds. Should not be engaged or **likely to be engaged in the propagation of sedition**
- **Validity**– Once granted, FCRA registration is **valid for five years and NGOs are expected to apply for renewal within six months** of the date of expiry of registration.
- In case of failure to apply for renewal, **the registration is deemed to have expired**.

Topic 55. SUPREME COURT SAID THAT WE CANNOT KILL CHILD AND NEED TO BALANCE OUT RIGHT OF UNBORN CHILD***Important for the subject: Polity***

Supreme Court said that we cannot kill child and need to balance out right of unborn child. The Supreme Court **deliberated on a woman's request** for a Medical Termination of Pregnancy (MTP).

The judges **emphasized the need to respect a woman's rights but also balance them with**



the rights of the unborn child.

- They discussed the **ethical dilemma of terminating a pregnancy at 26 weeks**, considering the potential risks to the child's health.
- The court **urged the woman to consider waiting for a few more weeks for the child's better chances of being healthy** and offered State care if needed.

What are the abortion law in India:

- **Abortion was initially illegal in India, resulting in imprisonment or fines under Section 312 of the Indian Penal Code.** To address this, the **Shantilal Shah Committee** was formed in **1964**, to assess the necessity of abortion regulations.
- This led to the **introduction of the Medical Termination of Pregnancy (MTP) Act in 1971, legalizing and regulating abortions.**
- Now abortions in India are **regulated by the Medical Termination of Pregnancy (MTP) Act, 1971.**
- Under the law **section 3 of the MTP Act 1971**, the doctor can **perform an abortion in the following conditions:**
- If the **pregnancy would be harmful to the life** of the patient or **affects her physical or mental health.** The doctor will need to consider the **circumstances of the patient to figure out if the pregnancy will harm her mental health, on a case to case basis.**
- If there is a **good chance that the child would suffer from physical or mental abnormalities** which would leave him or her seriously handicapped.
- If **pregnancy occurred as a result of a failure of contraception only applicable to married women.**
- If pregnancy is a **result of sexual assault or rape.**

Condition for termination of pregnancy:

- If the **pregnancy has not exceeded 12 weeks, only one doctor is needed to sign-off.**
- If the **pregnancy has exceeded 12 weeks and is below 24 weeks, two doctors are needed.**
- The **gestation period does not matter** if a doctor feels that an **immediate abortion must be conducted** to save the life of the patient.
- The doctor who determines if it is necessary to perform an abortion and performs it needs to be a **'registered medical practitioner'** under the law.
- In **January 2020**, the Union Cabinet approved **amendments to the MTP Act**, allowing women to seek abortions as **part of reproductive rights** and gender justice.
- The amendment **raised the upper limit of MTP from 20 weeks to 24 weeks** for women including **rape survivors, victims of incest, differently-abled women and minors.**

Topic 56. GOVERNMENT REVOKES NOD TO TEST NEW VACCINES ON STRAY DOGS

Important for the subject: Polity

A government committee tasked with animal welfare and protection has withdrawn



a 2022 circular that allowed stray dogs to be used in vaccine trials.

About CPCSEA

- The Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) is a **statutory body** formed by the Act of the Indian Parliament **under the Prevention of Cruelty to Animals Act 1960**.
- Formed in 1964, it was revived in 1998, under the committed chairpersonship of Maneka Gandhi. In the last two years, the CPCSEA has bettered the life of the animals in laboratories across India.
- This committee is composed of members of the scientific community, **regulatory authorities** and animal activists.
- The CPCSEA functions with a brilliant network of volunteers who liaise with the laboratories.
- For the first time in India: over 665 laboratories are registered with the CPCSEA; Institutional Animal Ethics Committees (IAECs) are constituted in every laboratory, which are only empowered to approve research project proposals that use rats, mice, guinea-pigs or rabbits.
- Every project that uses canines, ovines, bovines or non-human primates can only be conducted if approved by the panel of scientific experts constituted for this purpose; guidelines on laboratory animal care and practice have been formulated and enforced; a protocol for the production of immunobiologicals from equines has been formulated and ratified by the Supreme Court of India.
- The CPCSEA has been deliberating on alternatives and working out modalities to introduce alternatives in basic/regulatory research and education, in keeping with the international arena; the CPCSEA, to date, has rehabilitated and homed over 300 dogs, 150 equines, 200 non-human primates and several cattle, cats, birds, rabbits and mice; the **CPCSEA proactively trains and guides scientific and non-scientific personnel** on issues of alternatives and laboratory animal welfare; and the CPCSEA has fought legal issues on laboratory animal care and use and have had verdicts that favoured alternatives and animal welfare.

What are the Key Emerging Alternative Testing Methods?

- **Organoids:** Organoids are three-dimensional cellular structures that emulate specific organs of the body. These miniature organs, developed from human cells or stem cells, provide a more accurate representation of human physiology, enabling researchers to study drug interactions in a human context.
- **Organs-on-Chip:** Organs-on-chip are small devices lined with human cells, mimicking the blood flow and cellular interactions within the body. These chips replicate key physiological aspects and allow researchers to analyze tissue-tissue interactions and chemical signals, providing a platform for more accurate drug testing.
- **3D Bioprinting:** 3D bioprinting technology enables the creation of complex human tissues and organs using patient-specific cells. This advancement allows for the development of personalized drug testing approaches, catering to individual variations in biology.



What is the Regulatory Mechanism of Clinical Trials in India?

- The major legislations that govern clinical trials in India are: **Drugs and Cosmetics Act, 1940**, **Medical Council of India Act, 1956** and **Central Council for Indian Medicine Act, 1970**, **Guidelines for Exchange of Biological Material (MOH order, 1997)**.

Prerequisites of conducting a clinical trial in India are:

- Permission from the **Drugs Controller General, India (DCGI)**.
- Approval from the Ethics Committee established under **Drugs and Cosmetics Rules**.
- Mandatory registration on the **ICMR** maintained website.

Topic 57. NAIK YESHWANT GHADGE

Important for the subject: History



V.C Yeshwant Ghadge Sundial Memorial” unveiled at Montone, Perugia in Italy **India’s Defence Minister Rajnath Singh paid tribute at the VC Yeshwant Ghadge Sundial**



Memorial in Montone, Italy.

The memorial commemorates the Indian soldiers' participation in the campaign to liberate Italy during World War II, shedding light on a shared military history often overlooked until Italy recently opened this memorial earlier this year.

Who was Yashwant Ghadge:

- Naik Yeshwant Ghadge was an **Indian war hero who served during World War II's Italian campaign (1943-45).**
- He epitomizes the forgotten Indian heroes of the war. Ghadge, at the **age of 23, single-handedly captured** an enemy post in **Montone, Italy.**
- He was **posthumously awarded the Victoria Cross, Britain's highest military honour.**

What was the Italian campaign of World War II

- Naik Ghadge **sacrificed his life during World War II's Italian campaign, which pitted the Allied Forces against the Axis Powers (Nazi Germany, Italy, and Japan).**
- The Allies **aimed to liberate Italy and began their counterattack** with the invasion of **Sicily in 1943.**
- While the Fascist Italian regime fell quickly, **fierce German resistance persisted along defensive lines** spanning the Italian mainland, including the area where Naik Ghadge lost his life, **situated between the Trasimene/Albert Line and the vital Gothic Line.**

What are some of the heroism of Indian soldiers in the war

- The Indian Army, led by the British during World War II, **provided more than 2.5 million soldiers to support the Allied cause.**
- Around **50,000 Indian soldiers took part in the Italian campaign, and sadly, 5,782 lost their lives.**
- Indian forces, including the **4th, 8th, and 10th Indian Divisions, as well as the 43rd Independent Gurkha Infantry Brigade, formed the third-largest group of Allied troops in Italy.**
- They made significant contributions to **crucial battles such as Monte Cassino and the breach of the Gothic Line, receiving recognition for their professionalism and their impact on the campaign.**



Topic 58. ASHOKA'S GOLD MINE SET FOR COMEBACK NEXT YEAR

Important for the subject :History



In a rock edict, the emperor Ashoka declared all the gold and gemstones found at Jonnagiri were his. Now, a private company 'Geomysore' is gearing up to start gold mining at the ancient site again.

About Suvarnagiri or Jonnagiri:

- The ancients called it **Suvarnagiri (Gold mountain)**. With time the name changed to **Sonnagiri** and then **Jonnagiri**.
- **Jonnagiri in Andhra Pradesh's Kurnool district** is just a village now, but in the days of **Ashoka The Great** it was the **headquarters of the southern part of his empire**.
- Some of his famous **3rd century BCE rock edicts** have been found here. A huge rock-cut well near a temple is probably a relic of an ancient gold rush.
- Hundreds of years later, the **Cholas** were **masters of Jonnagiri's gold**.
- In the **colonial period** the **British** tried but weren't very successful so they moved on to **Kolar**, about **300 km away in Karnataka**.

Back To Golden Age:

- The studies from **Geological Survey of India (GSI)** between **1991 and 1994** identified the potential for **gold extraction**.
- In **Jonnagiri** the mining company has to sift through **up to 2 tonnes of soil to find 1 gram of gold**.

DEEP DIVE: Gold was mined in Jonnagiri many centuries ago. This rock-cut well near a temple in the village is believed to be an ancient mining pit. However, by British times the mines were not profitable. Now, high prices and new technology have led to their revival



About the mining company:

- Geomysore is jointly owned by **Thriveni Earth Movers Pvt Ltd (60%)** and **Deccan Gold Mines Ltd (40%)**.
- It has spent the past 10 years analyzing the **Jonnagiri site**. Advanced exploration for gold mining includes **trenching, soil sampling, IP survey, magnetic survey and drilling**. Full-scale commercial operations at **Jonnagiri by August 2024**.
- They will be **only the second operational gold miner in India** after the **Karnataka government-owned Hutti Gold Mines Co Ltd**, and have set a target of producing about **1 tonne of gold every year** through the **open pit mining** and processing project.

How much gold does Jonnagiri hold?

- The gold is distributed across the **four blocks – east, west, south and north** – of the license area and detailed evaluation of the east block has shown the presence of **6.8 tonnes of mineable gold**. Enough to keep the mine going for **8-9 years**.



Moving Mountains Of Ore

- Gold in the Jonnagiri ore can be recovered with the cheap **'gravity separation' method**.
- To achieve the target of **1 tonne per annum of gold**, a processing plant with a capacity to sift through **1,500 tonnes of ore daily will be set up**.
- The ore will be crushed in three stages and then pulverized in a ball mill before the gold is separated from the dirt in a **hydrocyclone**, a kind of **centrifuge**.

Closed now, Kolar Gold mine was far bigger

- The **Kolar gold mines** are centuries old. The **Cholas** have tried for **gold mining** here more than **1,000 years ago**.
- British industrialist **John Taylor III** (his company- **John Taylor & Sons**) succeeded in extracting gold from the **Kolar mine** in the 1880s. In **1956** the company was **nationalized**.
- The Kolar mine was shut in 2001 due to a sharp fall in international gold prices. At that time the mine had yielded about **900 tonnes of gold**.
- **India's only significant gold producer** now is the **Hutti mine in Karnataka** that was revived in **1947**. Since then, it has produced nearly **2 tonnes of gold per year**.



Topic 59. WHY GANDHI WAS AGAINST JEWS STATE IN PALESTINE

Important for the subject: History

Why Gandhi was against Jews state:

Mahatma Gandhi expressed deep sympathy for the Jewish people who had faced historical persecution and equated their suffering with that of the untouchables in Hindu society.

He condemned the German persecution of Jews, even suggesting that war against Germany to prevent their persecution would be justified.

- However, Gandhi opposed the establishment of a Zionist state in Palestine, asserting it was inhumane to impose Jews on the Arabs and reduce them.
- He believed that any settlement in Palestine should be achieved with the goodwill of the Arabs, without the aid of force, as it violated their rights and aspirations.
- Gandhi also raised concerns about the impact on Jews in other parts of the world if they were forced to relocate to Palestine.

How Gandhi's position on Israel influenced India's foreign policy.

- Gandhi's stance on the Israel-Palestine issue was not unique and resonated with many leaders across the Arab world and anti-imperialists worldwide.
- They criticized Britain's administration of Palestine and the Balfour Declaration, which promised a homeland to the Jews in the British Mandate, thereby impacting the region's geopolitics.
- Gandhi's views deeply influenced India's first Prime Minister, Jawaharlal Nehru, and significantly shaped India's foreign policy for decades.
- India initially voted against the UN Resolution 181 that partitioned Palestine but eventually recognized Israel in 1950.
- However, official diplomatic relations with Israel were only established in 1992, under Prime Minister P V Narasimha Rao.

Topic 60. AFGHANISTAN EARTHQUAKE KILLS 2000: THE FREQUENT TREMORS THE COUNTRY SEES

Important for the subject: Geography

Powerful earthquakes in Afghanistan with magnitude 6.3 have killed more than 2,000 people and injured more than 9,000. Affected regions: Herat province, which borders Iran. The quake also was felt in the nearby Afghan provinces of Farah and Badghis

Earthquakes in Afghanistan:

- Afghanistan, hemmed in by mountains, has a long history of strong earthquakes, many in the rugged Hindu Kush region bordering Pakistan.



List of Afghan quakes over the past three decades:

BADAKHSHAN, 2023

- A magnitude **5 earthquake** struck the sparsely populated **northeastern province of Badakhshan**, 40 km (25 miles) southeast of **Jurm village**, killing at least 13 people in **Afghanistan and neighboring Pakistan**.

KUNAR, September 2022

- Strong tremors hit Kunar province of Afghanistan in September, killing eight.

PAKTIKA, June 2022

- A magnitude **1 earthquake** killed 1,036 people in the **eastern province of Paktika**, causing widespread damage and forcing Afghanistan to appeal for international aid.

HINDU KUSH, 2015

- A quake of **magnitude 7.5**, one of the **largest in Afghanistan's recorded history**, killed 399 people in **Afghanistan** and neighbours **Pakistan and India**.

HINDU KUSH, 1991 and 2002

- Twin earthquakes in the **Hindu Kush (Afghanistan, Pakistan and Soviet Union)** in March 2002 killed a total of 1,100.

QAYEN, 1997

- A **magnitude 7.2** quake on the **border of Afghanistan and Iran** killed more than 1,500 in both countries and destroyed more than 10,000 homes.
- **TAKHAR**, February-May 1998- **magnitude 6.6**

Topic 61. HOW A 6.3 MAGNITUDE QUAKE CAUSED ANOTHER OF SAME INTENSITY

Important for the subject: Geography

Chronology of earthquake events in Afghanistan:

October 7: two earthquakes (within 30 minutes) of shallow focus (14 km depth) and 6.3 magnitude struck **herat province**.

October 11: Another shallow focus quake (13.5 km) of the same intensity (6.3 magnitude) struck the same province.

Cause of these earthquakes:

- **Locational analysis** of all the three quakes shows that there is a **systematic migration pattern**. In this case, there is a **migration of quakes from west to east**. The



earthquakes occurred within the Eurasia plate in an intracontinental mountain belt.

- All three earthquakes have been **thrust faults**, otherwise known as **reverse faults**. Thrust faults form due to **horizontal compressive stresses** and so cause **shortening of the crust**.
- Here one block or wall (the hanging wall) moves up relative to the other (called the footwall). The **thrust faulting** occurred near the far **western terminus of the Hindu Kush Mountain range**.

Why is the second earthquake not called an aftershock?

- To call a quake an aftershock, the **magnitude has to be lesser than the magnitude of the main event [quake]**.
- A quake of **6.3 magnitude** was followed by another of the same magnitude. This can happen **when a fault at one place ruptures resulting in an earthquake that releases the stress**. The release of stress in one fault results in the loading of stress at another fault.
- The loading of stress can result in another earthquake which can be of similar magnitude or even higher magnitude. But the magnitude will not be smaller than the first quake.
- In **subduction zones** and in the **Himalayas** where there is interaction between two continental plates, the **fault lengths can be very large and also very wide**. That is the reason why an earthquake in the fault can trigger another in the same fault.

Foreshocks, aftershocks – what’s the difference?

- “**Foreshock**” and “**aftershock**” are relative terms.
- **Foreshocks** are earthquakes that **precede larger earthquakes in the same location**.
- An earthquake cannot be identified as a foreshock until after a larger earthquake in the same area occurs.
- **Aftershocks** are **smaller earthquakes** that occur in the same general area during the days to years following a larger event or “**mainshock**.”
- They occur **within 1-2 fault lengths away** and during the period of time before the background seismicity level has resumed.
- As a general rule, **aftershocks represent minor readjustments along the portion of a fault that slipped at the time of the mainshock**. The frequency of these aftershocks decreases with time.
- Historically, **deep earthquakes (>30 km) are much less likely to be followed by aftershocks than shallow earthquakes**.

Earthquakes in Afghanistan:

- Earthquakes are quite common in Afghanistan due to **active interactions** between **three tectonic plates — the Arabia, Eurasia, and India plates**.
- Earthquakes in **western and central Afghanistan** are primarily influenced by the **northward movement** of the **Arabia plate** relative to the **Eurasia plate**.
- Beneath the **Pamir-Hindu Kush Mountains** of **northern Afghanistan**, earthquakes occur to depths as great as **200 km** as a result of **remnant lithospheric subduction**.
- **Shallow crustal earthquakes** in the **Pamir-Hindu Mountains** occur primarily along the **Main Pamir Thrust** and other active **Quaternary faults**, which accommodate much of the region’s crustal shortening.
- The **western and eastern margins** of the **Main Pamir Thrust** display a combination of **thrust and strike-slip mechanisms**.



Topic 62. IAF CHIEF UNVEILS NEW ENSIGN AS THE FORCE MARKS 91ST ANNIVERSARY

Important for the subject: Schemes



Indian Air Force (IAF) Chief Air Chief Marshal (ACM) Vivek Ram Chaudhari unveiled a new Ensign for the force, as it marked its 91st anniversary, by the inclusion of the Air Force Crest in the top right corner of the Ensign, towards the fly side.

- This year, the **Air Force Day (8 October)** parade was held at **Air Force Station Bamrauli in Prayagraj.**
- **Theme** for this year’s Air Force Day was **‘IAF – Air Power Beyond Boundaries’.**

New Ensign:

- Earlier, the **Royal Indian Air Force (RIAF) Ensign** comprised of the **Union Jack** in the upper left canton and the **RIAF roundel (Red, White & Blue)** on the fly side.
- **Post-Independence**, the **IAF ensign** was created by **replacing the Union Jack** with the **Indian tricolor** and the **Royal Air Force roundels** with the **IAF tricolore roundel.**
- A **new IAF ensign** has now been created to **better reflect the values of the Force.**

Details of the new ensign:

- The **IAF Crest** has the **national symbol, the Ashoka lion** on the **top** with the words **‘Satyameva Jayate’ in Devanagari** below it.
- Below the **Ashoka lion** is a **Himalayan eagle** with its wings spread, denoting the **fighting qualities** of the IAF.
- A **ring in light blue color** encircles the **Himalayan eagle** with the words **‘Bharatiya Vayu Sena’** and the **motto of the IAF** is inscribed below **Himalayan eagle** in **golden Devanagari.**
- Last September, the **Indian Navy** too had **adopted a new naval ensign** as part of measures to move to do away with colonial practices.

IAF’s first woman officer:



- This is the **first Air Force Day Parade** to be commanded by a woman officer, **GP Capt. Shaliza Dhami**.
- She is also the **first woman officer** of the IAF to command a **combat unit**.
- For the first time, the **parade had an all women contingent** composed of the newly inducted **Agniveer Vayu women**.
- The parade also included a **flight of Garud Commandos of the IAF for the first time**, as they recently completed **20 years of service**.