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AUGUST 2024

1. HISTORY AND CULTURE

1.1 Kakori Train Action

The historic Kakori train action, a significant event in Indian freedom will be celebrated throughout Uttar Pradesh.

- **Kakori Train Action** – It was a train robbery event that took place at Kakori, a village near Lucknow, **on 9 August 1925**.
- **Organizers** - It was organized by the Indian revolutionaries of Hindustan Republican Association (HRA).
- **Leaders** - Ram Prasad Bismil and Ashfaqullah Khan.
- **Other member of the plan**- Rajendra Lahiri, Chandra Shekhar Azad, Sachindra Bakshi, Keshab Chakravarty, Manmathnath Gupta, Mukundi Lal, Murari Lal Gupta and Banwari Lal.
- **The 100th anniversary** of this incident will be celebrated in 2025.
- **Event**
 - On 9 August 1925, the Number 8 Down Train was travelling from Shahjahanpur to Lucknow.
 - It carried treasury bags meant to be deposited in the British treasury in Lucknow.
 - When it passed Kakori village, Rajendra Lahiri pulled the emergency chain to stop the train.
 - Subsequently Ram Prasad Bismil, Ashfaqullah Khan and others entered the train and looted the money.
 - Due to a misfiring, one passenger (a lawyer named Ahmad Ali) was killed during the robbery.
- **Reaction by the British** – They launched violent crackdown and arrested several members of the HRA.
- Rajendranath Lahiri, Ashfaqullah Khan, Ram Prasad Bismil & Thakur Roshan Singh were hanged for it in 1927.
- The only major leader of HRA at this time who evaded arrest was Chandrashekar Azad.
- **Transform into HRSRA** - In 1928, after the execution of the Kakori Conspiracy accused, the HRA merged with various other revolutionary groups in Punjab, Bihar and Bengal and became the **Hindustan Socialist Republican Association (HSRA)**.

Hindustan Republican Association (H.R.A.) was formed in 1924, as a radical revolutionary organization. Their manifesto Krantikari (Revolutionary) was released on January 1, 1925.

1.2 Har Ghar Tiranga

The Prime Minister paid tribute to Pingali Venkayya on his birth anniversary, honoring his role in creating Tricolour to the nation.

- 'Har Ghar Tiranga' is a campaign under the aegis of Azadi Ka Amrit Mahotsav to encourage people to bring the Tiranga home and to hoist it to mark the 75th year of India's independence.
- **Objective**- The idea behind the initiative is to invoke the feeling of patriotism in the hearts of the people and to promote awareness about the Indian National Flag.
- The National Flag of India is horizontally rectangular in a shape.
- **Date of Adoption**- July, 1947.
- **Designer**- Pingali Venkayya
- **Proportions**- 3:2 (Length to Height ratio)
- **Dimension**- The ratio of the width to length of the Flag is 2:3.
- **Colors**
 - **Saffron (Top band)** - It signifies courage, sacrifice, valour, wisdom and action.
 - **White (Middle band)** - It stands for purity, peace and tranquility.
 - **Green (Bottom band)** - It symbolises growth of the country, the vegetation, agriculture and plant life.

Pingali Venkayya was an Indian freedom fighter and the designer of the Indian national flag.

- **Ashoka Chakra**- It is on the white band which has 24 equally spaced spokes.
- The Navy blue in the Chakra refers to the boundless sky and fathomless sea and the inner energy.
- The wheel/chakra is the Law of Dharma.
- It also means 24 hours a day which indicates movement of time i.e., the progressiveness of the country.

Flag Code of India 2002

- It is a set of laws & conventions that governs the use, display, and hoisting of the Indian National Flag in the country.
- It came into effect on January 26, 2002.
- Before that the activities concerning the national flag were governed by the provisions of The Emblems and Names (Prevention of Improper Use) Act, 1950, and The Prevention of Insults to National Honour Act, 1971.
- The Union government amended the flag code to support the 'Har Ghar Tiranga' campaign from August 13-15, celebrating 75 years of Independence as part of 'Azadi Ka Amrit Mahotsav'.

1.3 Homo floresiensis

New clues emerge on the evolutionary origins of extinct hobbits that once lived on Indonesia's Flores Island.

- **Homo floresiensis** - It is an **extinct species** of small archaic human that inhabited the Island of Flores, Indonesia.
- They are also called **Flores men or the 'hobbits' of Indonesia's** Flores island.
- Homo floresiensis fossils were first discovered in 2003.
- **Characteristics** - They were about 100 centimetres tall and 30 Kg weight.
- **Body Size** - Body size had reduced from large-bodied Asian Homo erectus sometime between 1 and 0.7 million years ago due to island dwarfism.
- **Appearance** - Tiny brains, large teeth for their small size, shrugged-forward shoulders, no chins, receding foreheads, and relatively large feet due to their short legs.
- **Tools** - Made and used stone tools and may have used fire.
- **Hunting** - Hunted small elephants and large rodents, and coped with predators such as giant Komodo dragons.
- **Recent findings** - Discovery of 3 hominin fossils dating to 700,000 years from Mata Menge in central Flores.
- Most of the Homo floresiensis fossils are found at Liang Bua cave in Indonesia.
- **Theories of their origin**
 - **Theory 1** - Homo floresiensis was a dwarfed descendant of early Asian Homo erectus.
 - Homo erectus, extinct species may have lived between 100,000 and 1.6 million years ago.
 - **Theory 2** - Homo floresiensis is a descendant of a more ancient hominin from Africa like Homo habilis or the famous 'Lucy' (Australopithecus afarensis).



Island dwarfism is an evolutionary process that results from long-term isolation on a small island with limited food resources and a lack of predators.

1.4 Commemorative stamp

The Union government will release commemorative postage stamps to celebrate the Paris 2024 Olympics.

- Commemorative stamps are issued, as the name suggests, commemorating important events
 - Prominent personalities in various fields
 - Aspects of nature
 - Beautiful or rare flora and fauna
 - Environmental issues

- Agricultural activities
- National/international issues
- Games etc.
- **Released by-** *Department of Posts, Ministry of Communications.*
- They are only available at Philatelic Bureaux and counters or under the Philatelic Deposit Account Scheme.
- They are printed in limited quantities.
- An event which is not nationally important enough to be commemorated by issue of a Commemorative/Special stamp may be commemorated by the Department by issue of Special Covers.
- It can be cancelled with a special cancellation at the post office selected for the purpose.
- Such covers can also be issued at the instance of private parties on payment of requisite charges.
- They should bear minimum postage stamps of any kind equivalent to the minimum inland letter mail rate.

Paris 2024 Olympics

- The 2024 Summer Olympics is the Games of the XXXIII Olympiad also known as Paris 2024 Olympics.
- Paris will serve as the main host city, with 16 other cities across European France joining in the celebration of sport.
- **Motto-** It is "Games wide open," reflecting the inclusive and welcoming nature of the event.
- **Events date-** 26 July to 11 August 2024
- **Total events-** 329 events
- **Total sports-** 32 sports (including the 4 additional sports)
- These sports are breaking (making its Olympic debut), sport climbing, skateboarding, and surfing.

1.5 Qutb Shahi tombs complex

After a decade-long restoration effort by the Telangana government and Aga Khan Trust for Culture the Qutb Shahi Heritage Park was opened to the public recently.

- **Built by** - The kings of the Qutb Shahi dynasty, who ruled the Golconda sultanate from 1518–1687.
- **Located in** - Ibrahim bagh in Hyderabad.
- It consists of 30 tombs, mosques and a mortuary bath.
- It belong to the rulers of the Qutb Shahi Dynasty, their queens and children and the nobles who faithfully served them.
- **Architecture** – They are of Indo-Muslim architecture, a style that combines Indian and Persian architectural influences.
- It features onion domes on top of cubes, surrounded by arcades with ornamental details and small minarets with floral motifs.
- The tombs are quadrangular in shape, with galleries in the smaller tombs that are single-story and larger galleries in the two-story tombs.
- In the center of each tomb is a sarcophagus that sits above a burial vault in a crypt below.
- The domes were originally covered in blue and green tiles. The most impressive tomb in the complex is that of Mohammed Quli Qutb Shah, which is 42 meters tall and covered by a large dome.
- It is a UNESCO World Heritage Site.



1.6 Qutb Shahi Dynasty (1518-1687)

- **Founded by** - Quli Qutb Shah
 - Quli Qutb shah is a Turkish governor of the Bahmani eastern region, who declared independence in 1518 and moved his capital to Golconda.

- The kingdom stretched from the Godavari River in the north, sharing a border with Tamil Nadu to the south, Bijapur to the west, and the Bay of Bengal to the east.
- **Ethnicity** - The Qutb Shahis were Shia Muslims who belonged to the Turkmen tribe from the Turkmenistan-Armenia region.
- **Trade** - The Qutb Shahis are known for their contributions to trade, developing links with the Middle East, Europe, and East Asia. The port city of Masulipatnam flourished under their rule.
- **Architecture** - The dynasty is also known for its distinct style of Indo-Islamic architecture, seen in the city of Hyderabad and its surroundings.
- The dynasty ended in 1687 when the Mughal emperor Aurangzeb's army conquered Golkonda.

1.7 Good Maharaja Memorial

Recently, Indian Prime Minister paid tribute at the memorials of Jam Saheb of Nawanagar, also known as the Good Maharaja.

- **Good Maharaja Memorial**- It honours Jam Saheb Digvijaysinhji Ranjitsinhji Jadeja.
- **Location**- Warsaw, Poland.
- **Memorial Details** - It is a small brick pillar with inscriptions, was unveiled in October 2014 at the Square of the Good Maharaja, in the Ochota district of Warsaw.

Jam Saheb Digvijaysinhji Ranjitsinhji Jadeja

- He was the Maharaja of Nawanagar, a princely state in present-day Gujarat, India.
- Born- September, 1895
- **Historical Significance**- During World War II, he sheltered over 1,000 Polish children fleeing Nazi-occupied Poland and Soviet camps.
- **Polish Schools Named After Jamsaheb**- Eight Polish primary and secondary schools are named after Jamsaheb, acknowledging his generosity and kindness.
- **Association of Surviving Polish Children**- The Polish children sheltered by the Jamsaheb formed an Association of Poles, meeting annually in a major Polish city.
- **Role in India independence**- He was a strong supporter of India's independence and played a key role in the Constituent Assembly, representing the princely states.
- **Significance** - They highlight India's humanitarian contributions during World War II, with Jam Saheb and the Kolhapur Royal Family playing key roles in providing refuge to Polish citizens displaced by the war.

Other memorial visits by PM

Memorial	Description
Valivade-Kolhapur Camp Memorial	It is dedicated to the generosity of the princely state of Kolhapur, which provided shelter to around 5,000 Polish refugees during World War II.
Monument to the Battle of Monte Cassino	It commemorates the sacrifice of soldiers from Poland, India, and other countries who fought together during the Battle of Monte Cassino in Italy during World War II.

1.8 Namdhari Sect

8 persons were recently injured after 2 factions of the Namdhari sect opened fire at each other over a land dispute near the dera in Sirsa's Jiwan Nagar in Haryana.

- **A Sikh sect** – It *differs from mainstream Sikhs* chiefly in that it believes that the lineage of Sikh Gurus did not end with Guru Gobind Singh (10th human Sikh Guru).
- They were also **known as “Kukas”** for their trademark style of reciting the “Gurbani” (Teachings of the Guru).
- This style was in a high-pitched voice called “*Kook*” in *Punjabi*.
- **Kuka Movement** - It marked the *1st major reaction of the people in Punjab* to the new political order initiated by the British after 1849.
- The Namdhari Movement, of which the Kuka Movement was the most important phase, aimed at overthrowing the British rule.
- **Founded by** - Satguru Ram Singh on Baisakhi in 1857.
- **Satguru Ram Singh**
 - He challenged the status quo, advocated social reform, and resisted the Raj in various ways.
 - He asked his followers to **boycott everything** which bore the stamp of the British Government.
 - He appointed Governors and Deputy Governors to organize Kukas in different districts of Punjab.
 - He also inspired young men by giving military training.
- The British inflicted terrible punishments on the Namdharis and deported Ram Singh to Rangoon, from where he never returned.
- People believe Ram Singh is still alive, will return and until then, they mourn his absence by wearing white.
- Kukas supported *civil disobedience and the Non-Cooperation movement* for Indian independence.
- **Supreme Gurbani** - Namdhari Sikhs consider the *Guru Granth Sahib as the Supreme Gurbani*, but they also believe in a living human Guru.
- **Belief** - They consider the cow to be sacred, they are teetotalers, and *avoid even tea and coffee*.
- **Headquarters** – Its headquarters is located in Ludhiana’s Bhaini Sahib near village Raiyaan, where Ram Singh was born.
- **Spread**– It has its *deras across Punjab and Haryana*, and has a presence in a few *other countries*, too.

2. GEOGRAPHY

2.1 Kalasa-Banduri project

A team from the Progressive River Authority for Water and Harmony (PRAWAH) recently visited Belagavi district, reigniting the dispute between Karnataka and Goa over the Mahadayi River.

- **Background** - The Kalasa-Banduri Project is a Karnataka government initiative first proposed in the 1980s.
- It aims to *divert water from the Mahadayi River to the Malaprabha River* to improve drinking water supplies to the districts of Belagavi, Bagalkote, Dharwad, and Gadag.
- The Kalasa nala project, part of the Kalasa-Banduri Project, involves building barrages to store and lift water from the stream and divert it into the Malaprabha.
- The entire project aims to construct a total of 11 dams on the river Mahadayi.
- The project would also involve diverting around 27 hectares of land, including 11 hectares in a tiger corridor between Karnataka and Goa.
- **The Dispute** – It is delayed due to *inter-state water dispute* between *Karnataka, Goa, and Maharashtra*.
- Argument of Goa – The project would reduce the flow of water into the Mahadayi, damaging its natural flow and ecology.
- It would also impact tiger conservation and concerns over ecological damage.



- **Tribunal** - The Mahadayi Water Dispute Tribunal was set up in 2010 to look into the issue.
- The Tribunal in 2018 awarded 13.42 TMC water from Mahadayi river basin to Karnataka, 1.33 TMC to Maharashtra and 24 TMC to Goa.

Mahadayi River

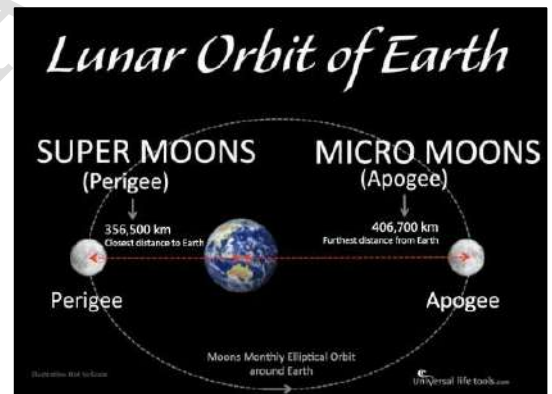
- Mahadayi originates inside the Bhimgad Wildlife Sanctuary in the Belagavi district of Karnataka.
- It flows through Karnataka, Goa, and Maharashtra.
- It is called as Mandovi River in Goa.
- Salim Ali Bird Sanctuary in Chorao Island, Goa is located on the Mandovi River.
- **Tributaries** - Kalasa Nala, Surla Nala, Haltar Nala, Poti Nala, Mahadayi Nala, Pansheer Nala, Bail Nala, Andher Nala.



2.2 Super Blue Moon

Recently, a rare super blue Moon light up the skies, visible across different parts of the world depending on local time zones.

- **Perigee** – It is the point closest to earth in the moon’s elliptical orbit
- **Apogee** - The point that is farthest from earth in Moon’s orbit.
- **Supermoon**- A supermoon occurs when the moon is at its closest point to Earth (perigee) during a full moon. (This happens with a new moon as well but it is not visible.)
- The term is coined by astronomer **Richard Nolle in 1979**.



- **Appearance** – It appears about 14% bigger and 30% brighter than when it is farthest from Earth (apogee).
- **Frequency** – It occur roughly 25% of the time during full moons.
- **Blue Moon**- NASA describes it as the situation when a full moon is seen twice in a single month.

- It happens every 2 to 3 years.
- It relies on the astronomical season, defined as a period between a solstice and an equinox.
- It defines blue Moon is the 3rd full Moon in a quarterly season of four full Moons.
- **Super Blue Moon**- It is a rare astronomical phenomenon that combines 2 distinct events, a "supermoon" and a "blue moon."
- **Appearance**- It will not appear blue in colour.
- The name "blue moon" does not relate to its colour.
- During a supermoon, the moon appears larger and brighter in the sky compared to a typical full moon.
- **Next Super blue moon**- The next Super Blue Moon will be seen in January 2037.

A full moon occurs when the Earth is between the Sun and the Moon occurs roughly once a month, on average.

2.3 Guam Island

Recently, *INS Shivalik* arrived in Guam for an Operational Turnaround after successfully participating in RIMPAC 2024, the world's largest multinational maritime exercise.

- **Guam Island**- Guam is an island located in the western Pacific Ocean and is the largest and southernmost of the Mariana Islands, United States.

- **Capital** - Hagatna.
- **Location**- Guam is situated in east of the Philippines and west of Hawaii.
- **Status**- Guam is not a country but a U.S. territory.
- It is governed by an elected governor and legislature but is under federal control, similar to U.S. states.
- **Topography**- It features a mix of rugged limestone plateaus and low-lying coral reefs.
- The northern part is relatively flat, while the southern part is mountainous with lush valleys and waterfalls.
- **Climate**- Tropical climate tempered by the northeast trade winds and the north equatorial ocean current.
- **Ancient Inhabitants**- The indigenous Chamorro people have lived on Guam for over 4,000 years.
- **Colonial Era**- Guam was first discovered by Europeans when Ferdinand Magellan arrived in 1521.
- It was later colonized by Spain in 1668 and remained under Spanish control for over 200 years.
- **Flora and Fauna**- It includes some endangered species like the Guam rail.



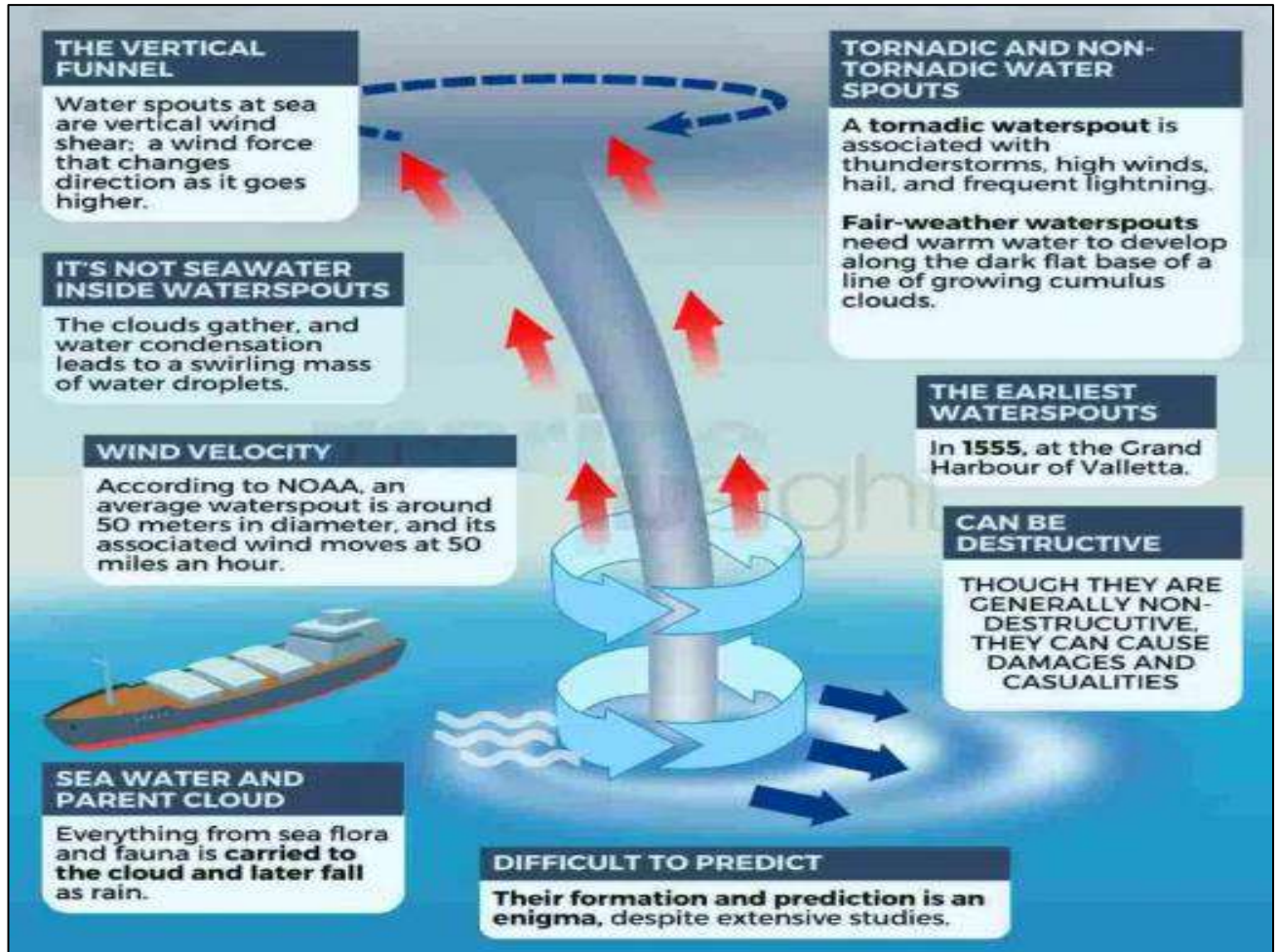
2.4 Waterspout

A luxury yacht in Mediterranean Sea was hit & sank by a violent storm, could be a waterspout off the coast of Sicily, Italy.

- **Waterspout** – It is a tornado over water that is a large column of air and mist rotating over a water body.
- **Favorable Condition** - They occur when there are high levels of humidity and relatively warm water temperatures compared to the overlying air.
- **Size & Physical characteristics**- The average waterspout can be around 165 feet in diameter, with wind speeds of 100 kilometres per hour.
- **Duration** - It typically lasts for around 5 minutes and occasionally it can last up to 10 minutes.
- **Occurrence** - Although waterspouts are more common in tropical waters, they can appear anywhere.
- **Types** - Tornadic waterspouts and Fair-weather waterspouts.
- **Tornadic Waterspouts** – They are actual tornadoes that form over water or move from land to water.
 - They are accompanied by severe thunderstorms, high winds and seas, large hail, and frequent dangerous lightning.
 - Tornadic waterspouts develop downward in a thunderstorm. They can be large and may lead to considerable destruction.
- **Fair-weather waterspouts** – They form over only water usually along the dark flat base of a line of developing cumulus clouds.
 - It develops on the surface of the water and works its way upward.
 - This type of waterspout is generally not associated with thunderstorms.
 - **Favourable condition** - They are formed during fair weather.
 - **Movement** - Fair weather waterspouts form in light wind conditions so they normally move very little.
 - Typically, fair weather waterspouts dissipate rapidly when they make landfall, and rarely penetrate far inland.
 - They are less dangerous and usually small.
- **Increased frequency of occurrence** – With increase in sea surface temperature, the frequency of waterspouts is increasing.



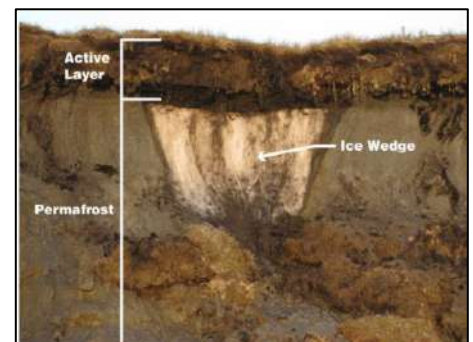
- The best way to avoid a waterspout is to move at a 90-degree angle to its apparent movement



2.5 Toxic mercury in Arctic's permafrost

As the Arctic's permafrost thaws in a warming climate, an enormous amount of toxic mercury is being released into the environment.


- **Permafrost** – An area that remains completely frozen 32°F (0°C) or colder—for at least two years straight.
- **Composition** - It is made of a combination of soil, rocks and sand that are held together by ice.
- **Occurrence** - Most common in regions with high mountains and in Earth's higher latitudes near the North and South Poles.
- **Active layer** – It is the top layer of the permafrost that does not stay frozen all year.
- It thaws during the warm summer months and freezes again in the fall.
- **Permafrost Thawing** - As Earth's climate warms, the ice inside the permafrost melts, leaving behind water and soil.
- **Mercury Bomb** - A significant amount of total *mercury (THg)* is *liberated from permafrost* during glacial erosion in Arctic.
- Abrupt thawing events can rapidly mobilise metres-thick deposits of sediment, potentially releasing large mercury.
- The mercury content was generally higher in sediment, with finer rather than coarser grains
- **Thaw slumps** – It is a *type of landslide* that occurs in the terrestrial Arctic's permafrost region.
- Thaw slumps adjacent rivers around the arctic region - Mackenzie River, Yukon and Koyukuk Rivers, elevate suspended particulate mercury contents downstream.



- Most mercury eroded from the banks during river migration is redeposited with sediments.
- **Arctic Mercury** - Mercury is a global environmental contaminant with both natural sources and sources associated with human activities.
- Much of the mercury contaminating the Arctic is a result of transport *by air and ocean pathways* from sources outside of the Arctic.
- Over **98%** of atmospheric mercury is emitted outside the region and is transported to the Arctic via long-range air and ocean transport.
- **Impact** - People and wildlife living in the Arctic are *highly exposed to mercury*.
- Mercury is a *neurotoxin* that can cause serious harm to the brain and nervous system, particularly when it accumulates in the food chain.
- Many indigenous communities, including Alaskan communities, rely on subsistence fishing and have disproportionately elevated blood mercury levels linked to dietary exposure.

2.6 Island of Madeira

Wildfires in Madeira have endangered world-heritage forests and stranded tourists, with nearly 6% of the island's total area burned.

Aspect	Details	
Location	<ul style="list-style-type: none"> • Madeira is a Portuguese island located in the North Atlantic Ocean, part of the Madeira Archipelago. • It comprises the volcanic islands of Madeira, Desertas, and the Porto Santo. • The Portuguese archipelago of Madeira is located to the west of Morocco and to the southwest of the Portuguese capital of Lisbon. 	
Region	Iberian Peninsula (Spain and Portugal)	
Capital	Funchal	
Geography	It is the top of a massive, submerged shield volcano rising about 6 km from ocean floor	
Area	It is the largest and most populous island of the Madeira Archipelago	
Tourism	A highly popular tourist destination, known for its landscapes, wine, and mild climate	
Natural Heritage	Home to the largest surviving <i>laurel forests (Laurus nobilis) in the world</i> , a <i>UNESCO World Heritage Site</i>	

3. POLITY

3.1 National Financial Reporting Authority (NFRA)

The NFRA is set to meet with key financial regulators to adopt the revised International Standard of Audit 600.

Aspect	Explanation
Establishment	NFRA was established in 2018 under the Companies Act, 2013.
Purpose	It is an independent regulator setup to oversee and enforce compliance with accounting and auditing standards.
Jurisdiction	NFRA has authority over auditors of listed companies, large unlisted companies, and companies with securities listed on any stock exchange in India or abroad.

Composition	Chairperson who will be appointed by the Central Government and a maximum of 15 members.
Functions	Set standards, monitor compliance, investigate misconduct, and impose penalties.
Significance	Aims to enhance transparency and accountability in financial reporting.
Recent Activities	Currently focusing on adopting revised International Standard of Audit 600 (ISA 600).

3.2 ISA 600

Aspect	Explanation
Aim	<ul style="list-style-type: none"> To close auditing gaps that have caused major lapses and to ensure auditors gather sufficient evidence and evaluate component auditors' work.
Objectives of ISA 600	<ul style="list-style-type: none"> Tighten oversight on auditors, especially regarding reliance on subsidiary audit reports. Enhance group auditor's supervision and review of component auditors' work and documentation. Improve communication, oversight, and ethical requirements between group and component auditors.
Audit Lapses and Malfeasance	<ul style="list-style-type: none"> Auditors have been found shielding behind subsidiary audit reports, allowing malfeasance, such as siphoning off funds from listed companies. Reliance on subsidiary audits has been a recurring problem in lapses at companies like Reliance Capital, IL&FS, and CG Power.
Legal Framework	<ul style="list-style-type: none"> The revised standards require adoption by financial regulators like ICAI, NFRA, and SEBI before implementation in India. The Chartered Accountants Act, 1949, considers disclosing information acquired during professional engagement without client consent as professional misconduct.

3.3 Waqf board

The recently introduced *Waqf (Amendment) Bill governing Waqf boards* has proposed far-reaching changes, ensuring the representation of Muslim women and non-Muslims in such bodies.

Waqf

- Under the **Waqf Act of 1954**, a Waqf refers to a property dedicated in the name of God for religious and charitable purposes.
- Legally, it is the permanent dedication by a Muslim of any movable or immovable property for purposes recognized by Muslim law as pious, religious, or charitable.
- Establishment** – It can be established through a deed or instrument, or a property can be considered a Waqf if it has been used for religious or charitable purposes over a long period.
- To create a Waqf, one must be of sound mind and hold valid ownership of the property.
- Interestingly, the creator of a Waqf, known as the **Waqif**, does not have to be a Muslim, as long as they profess belief in Islamic principles.
- Regulation** – Once a property is designated as a Waqf, it becomes **non-transferable** and is detained perpetually as a charitable act toward God, essentially transferring ownership to God.

- It can be either public, serving charitable ends, or private, benefiting the property owner's direct descendants.
- **Functions** - Their proceeds typically fund educational institutions, graveyards, mosques, and shelter homes.

Waqf board

- A Waqf board is a legal entity capable of acquiring, holding, and transferring property.
- It can sue and be sued in court.
- **Members** - Each state has a Waqf Board led by a chairperson, including
 - Nominees from the state government,
 - Muslim legislators,
 - Parliamentarians,
 - Members of the state bar council,
 - Islamic scholars, and mutawalis (managers) of waqfs with an annual income of Rs. 1 lakh and above.
- Powers – It administers Waqf properties, recovers lost properties, and sanctions the transfer of immovable Waqf properties through sale, gift, mortgage, exchange, or lease.
- **Voting** - At least two-thirds of the board members voting in favour of the transaction.
- The board appoints custodians to ensure the Waqf and its revenue are used for their designated purposes.
- **Central Waqf Council (CWC)** - The **Central Waqf Council (CWC)**, established in 1964, oversees and advises state-level Waqf Boards across India.

3.4 Lateral Entry

The UPSC recently issued advertisement to recruit 45 candidates through lateral got criticism from opposition party that the centre was trying to bypass reservation policies.

- It was first endorsed by the Second Administrative Reforms Commission established by it in 2005.
- **Lateral entry** – It is the appointment of specialists (including those from the private sector) in government departments on a contract basis for a **period of 3 years**.
- **Duration** – It can be extended up to 5 years based on the performance.
- **Recommended by** – NITI Aayog in 2017.
- **Posts** – The first vacancies for lateral entrants were advertised in 2018, but only for **Joint Secretary level positions**.
- Posts of the rank of Director and Deputy Secretary were opened later.
- Directors are one rank below Joint Secretaries, and Deputy Secretaries are one rank below Directors, although in most ministries, they perform the same job.
- Directly recruited Central government employees are **not eligible** for these posts.
- **Experience** - Applicants for the post of joint secretary should have a minimum of 15 years' experience in the relevant domain.
- **Age limit**
 - Joint secretary – 40 and 55.
 - Director – 35-45.
 - Deputy secretary posts - 32-40
- **No quota** - Reservation or caste-based quotas do not apply to these recruitments.
- In the last few years, a total of 63 appointments have been made through this route out of which 35 were sourced from the private sector.

Joint Secretary is the third-highest rank (after Secretary and Additional Secretary) in a Department, and functions as the administrative head of a wing in the Department.

4. GOVERNMENT POLICIES AND INTERVENTIONS

4.1 Skill India Digital Hub

The Union Minister of Skill Development and Entrepreneurship recently discussed the utility and purpose of Skill India Digital Hub in the Rajya Sabha session.

- The Skill India Digital Hub was launched with a purpose to enhance skill development, education, employment, and entrepreneurship in the country.
- It offers industry-relevant courses, job opportunities, and entrepreneurship support.
- It uses a mobile-first approach to provide course discovery, digital skilling, and verified credentials.
- **Launched in-** September, 2023.
- **Nodal Ministry-** Ministry of Skill Development and Entrepreneurship (MSDE).
- **Objective-** The objective is to offer diverse skill training programs so that individuals can pursue courses and develop careers at any stage of life.
- **Features**
 - **Courses and Training Programs-** It offers a wide range of courses across various sectors like IT, manufacturing, healthcare, agriculture, and more.
 - **Certifications-** It provides certifications upon completion of courses, which can enhance employment opportunities.
 - **Partnerships-** The platform Collaborates with educational institutions, industry partners, and government bodies to ensure the relevance and quality of training.
 - **Skill Mapping-** It Uses data analytics to map skills in demand and align courses accordingly.
- **Achievements-** By June 2024, it registered around 88 lakh candidates, with 7.63 lakh for online courses.
- The platform offers 752 online courses and 7.37 lakh minutes of digital content.
- It integrates with MSMEs and supports entrepreneurship schemes.

Initiatives on Skill Development and Entrepreneurship

- The Ministry of Skill Development and Entrepreneurship (MSDE) has launched several initiatives, including
- **STRIVE Project-** Digital content in blended mode for 14 trades and a Virtual Reality (VR) pilot in five ITIs.
- **Bharat Skills Portal-** Provides e-books, question banks, and e-learning videos in 12 regional languages.
- **Partnerships with IT Companies-** Collaborations with IBM, CISCO, AWS, and Microsoft to offer training in AI, Big Data, Blockchain, and Cloud Computing via the Bharatskills portal.
- **Advanced Diploma Program-** A 2-year vocational program in IT, Networking, and Cloud Computing offered in collaboration with IBM.

4.2 New Blue Revolution Initiatives

The Union Minister for the Ministry of Fisheries, Animal Husbandry & Dairying recently discussed the government initiatives on the New Blue Revolution in the Lok Sabha session.

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

- **Launched-** September 2020.
- **Duration-** FY 2020-21 to FY 2024-25.
- **Aim-** It aims to bring about the Blue Revolution through sustainable and responsible development of the fisheries sector in India.
- **Objective-** The scheme targets activities that have the potential to create employment opportunities, including seaweed and ornamental fish cultivation.
- It also emphasizes advancements in breeding techniques to ensure high-quality brood, seed, and feed, as well as the diversification of species.

Fisheries and Aquaculture Infrastructure Development Fund (FIDF)

- **Objectives-** To create and modernize capture & culture fisheries infrastructure
- To create of Marine Aquaculture Infrastructure
- To create and modernization of Inland Fisheries Infrastructure
- To reduce post-harvest losses and improve domestic marketing facilities through infrastructure support
- To bridge the resource gap and facilitate completion of ongoing infrastructure projects
- **Support-** Concessional finance and interest subvention up to 3% per annum for a repayment period of 12 years.
- It creates employment opportunities to over 9.40 lakhs fishers'/fishermen/ fisher folks and other entrepreneurs in fishing and allied activities.

Pradhan Mantri Matsya Kisan Samridhi Sah Yojana (PMMKSSY)

- **Launched-** 2024.
- **Objectives**
 - **Formalize Sector-** Register fishers, farmers, and workers on a National Fisheries Digital Platform for better service delivery.
 - **Access to Finance-** Facilitate institutional financing for small fisheries enterprises.
 - **Insurance Incentive-** Provide a one-time incentive for purchasing aquaculture insurance.
 - Performance Grants Reward microenterprises for enhancing fisheries value chains and creating jobs.
 - **Safety and Quality-** Support micro and small enterprises in adopting fish safety and quality systems with performance grants.

4.3 Raising and Accelerating MSME Performance (RAMP) Scheme

Recently, the Raising and Accelerating MSME Performance (RAMP) scheme was in the news.

- **Aim-** It aims to enhance MSME capacity and coverage by fostering innovation, improving processes, enhancing market access, promoting greening initiatives, and supporting women-owned enterprises.
- **Nodal agency-** Ministry of Micro, Small and Medium Enterprises.
- **Launched in -** 2022.

Sub-Schemes under RAMP Scheme are as follows:



MSME Green Investment and Financing for Transformation Scheme (MSME GIFT Scheme)- would help MSMEs adopt green technology with interest subvention and credit guarantee support



MSE Scheme for Promotion and Investment in Circular Economy (MSE SPICE Scheme) -1st ever scheme to support circular economy projects to be done through credit subsidy thereby realizing the goal of Net Zero Emissions by 2070



MSME Scheme on Online Dispute Resolution for Delayed Payments (MSME ODR Scheme) -1st-of-its-kind scheme to synergize legal support with modern IT tools and AI to address the incidences of delayed payments for SMEs

- **Objectives-**
 - Accelerating Centre- State collaboration in MSME promotion and development.
 - Enhancing effectiveness of existing MoMSME schemes for technology upgradation.
 - Strengthening Receivable Financing Market for MSMEs and enhancing effectiveness of Credit Guarantee Trust for Micro & Small Enterprises (CGTMSE), and promoting guarantee for greening initiatives of MSEs, and women owned MSEs.
 - Reducing incidence of delayed payments to MSEs

- **Duration-** *5 years* (2021-22 to 2025-26).
- **Participant states-** *All States and UTs, except Delhi*, have shown interest in participating in RAMP.
- **Funding-** It is a *World Bank-supported Central Sector Scheme*.
- **Eligibility-** They should be registered under the Micro, Small, and Medium Enterprises Development (*MSMED*) Act, 2006.
- The MSME should have a valid **Udyog Aadhaar Number (UAN)**.

4.4 Employment-Linked Incentive Scheme

The Union Minister of Labour and Employment has called for the swift, mission-mode implementation of the Employment-Linked Incentive (ELI) Scheme.

- **Launched in - Union Budget 2024.**
- **Umbrella scheme** – Prime Minister’s package of 5 schemes announced in the budget.
- **Nodal Ministry-** Ministry of Labour and Employment
- **Aim** – To boost employment in the formal sector.
- To recognise first-time employees and provide comprehensive support to both employees and employers
- **Target** – *4.1 crore youth* over a five-year period.
- **Budget allocation-** Rs 2 lakh crore, as part of the Prime Minister’s package for 5 key schemes & initiatives.
- **3 ELI Schemes**

Scheme A - First-time employment

- **Benefit-** One-month salary as a direct benefit transfer to first-time workforce entrants in all formal sectors.
- **Payment-** Up to Rs. 15,000, disbursed in three instalments.
- **Eligibility-** Employees earning up to Rs. 1 lakh per month.
- **Impact-** Expected to benefit approximately 2.1 million young people.

Scheme B - Job creation in manufacturing

- **Benefit-** Specified incentive for EPFO contributions for both employees and employers during the first four years of employment.
- **Eligibility-** Aims to support 3 million new employees and their employers by reducing EPFO contribution burden.

Scheme C - Support to employers

- **Benefit-** Government reimbursement of up to Rs. 3,000 per month for two years towards EPFO contributions for new employees.
- **Eligibility-** For employees hired at a salary of up to Rs. 1 lakh per month.
- **Impact-** Expected to encourage the hiring of 5 million additional workers.

- **Significance-** Along with employment creation, also promote women’s workforce participation, support MSMEs in creating jobs, and strengthen capital infrastructure.

4.5 Scholarship Schemes for Minorities

The 2024 Union budget for education empowerment of minorities was slightly decreased.

- **Existing scholarship schemes** – During last five years, the Minorities ministry has implemented **3 Scholarship schemes**

- Pre-metric Scholarship
- Post-Matric Scholarship
- Merit-cum means Scholarship
- **2024 Union Budget** – It had modified all the 3 scholarship schemes and cancelled the Maulana Azad National Fellowship (MANF).
- **New Pre-metric scholarship** – It is now only for students studying in classes IX and X as free and compulsory elementary education (classes I to VIII) is provided to each and every child under Right to Education (RTE) Act, 2009.
- **New Post-matric scholarship** – Cover all the technical and/or professional courses of UG/PG level, except the listed institutes.
- **New Merit-cum-Means scholarship** – Cover all the technical and/or professional courses of UG/PG level only for the top listed institutions.
- **Discontinuation of MANF** – It was scrapped as it overlaps with various other fellowship schemes for higher education like
 - UGC and CSIR Fellowship Schemes are open for candidates of all social categories and communities including minorities.
 - Other Ministerial Fellowship Schemes like Ministry of Social Justice & Empowerment, Ministry of Tribal Affairs for SCs and OBCs and STs

Minorities in India
<ul style="list-style-type: none"> ● National Commission for Minorities Act 1992 – It had <u>notified 6 communities as minorities</u> ● Population - As per the Census 2011, they are <u>about 19.3% of the total population</u> of the country <ul style="list-style-type: none"> ○ Muslims - 14.2% ○ Christians - 2.3% ○ Sikhs - 1.7% ○ Buddhists - 0.7% ○ Jain - 0.4% ○ Parsis - 0.006%.

Ministry	Fellowship Schemes
Social Justice & Empowerment	<ul style="list-style-type: none"> ● National Fellowship for OBC Students ● Dr. Ambedkar Scheme of Interest Subsidy on Educational Loan for Overseas Studies for OBCs & EBCs ● National Fellowship for Scheduled Caste Students ● National Overseas Scholarship (NOS) Scheme for SC etc. candidates ● SHREYAS - Scholarships for Higher Education for Young Achievers Scheme (OBC & Others) ● PM YASASVI - PM Young Achievers Scholarship Award Scheme For Vibrant India For OBCs And Others.
Tribal Affairs	National Fellowship and Scholarship for Higher Education of ST Students

4.6 PM-KUSUM scheme

According to a CSE study, the PM-KUSUM scheme needs urgent recalibration to meet its 2026 targets.

- **PM-KUSUM** - Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyan.
- **Launched in** - 2019.
- **Nodal Ministry**- Ministry of New and Renewable Energy (MNRE).
- **Objectives** – To provide financial and water security to farmers through the installation of solar pumps & other renewable energy projects.
- To promote the use of solar energy in the agricultural sector and to reduce dependence on grid electricity, and
- To increase farmers' income by enabling them to sell surplus solar power.
- **Components**
 - **Component A**- Install a total of 10GV grid-connected stilt-mounted decentralized solar plants and other renewable energy-based power plants.
 - Each plant is sized up to 500KW to 2MV.

- **Component B-** Install stand-alone solar pumps of up to 7.5HP individual capacity and worth 17.50 lakh.
- **Component C-** Provide financial support to Solaris 10 lakh grid-connected agricultural pumps of 7.5HP of capacity each.
- **Significance** – It can reduce carbon emissions by 5.2 million tonnes.

4.7 Green National Highway Corridor Project

The Government of India and the World Bank have recently signed an agreement for the construction of Green National Highway Corridors Project (GNHCP).

- It is a safe, green, Climate resilient road that is built using green technologies in Himachal Pradesh, Rajasthan, Uttar Pradesh and Andhra Pradesh.
- **Launched in** – 2015.
- **Nodal Ministry** - Ministry of Road Transport and Highways.
- **Aim** - To provide smooth and motorable roads with all-weather connectivity of the nearby areas.
- To promote socio-economic development as well as enhanced trade and connectivity within the region.
- To enhance the institutional capacity of the Ministry of Road Transport and Highways in mainstreaming safety and green technologies.
- **Project Period** – 2020 to 2026.
- **World Bank Fund** - \$500 Million.
- **Features**– Conserving natural resources using cement treated sub base/reclaimed asphalt pavement.
- Promoting use of local/ marginal material such as lime, fly ash, waste plastic.
- Using bio-engineering measures for slope protection like coco fibre/Jute.
- Erosion control blanket with shrub/grass plantation and hydro seeding.
 - **Hydro seeding** - Mixture of seed, mulch, fertilizer, and water is sprayed onto the soil surface using specialized equipment.
 - It is used for controlling erosion and promoting vegetation growth on bare or disturbed soil surfaces.
- Shotcrete crib wall with vegetation, Bamboo Plantation, Hedge Brush Layer.
 - **Hedge Brush layering** is a revegetation technique, which combines layers of dormant or rooted cuttings with soil to revegetate and stabilize both streambanks and slopes.
- Use of chain mesh with grass strips, Geocell with hydroseeding etc. for slope protection.
 - Geocell is a 3- dimensional honeycombl like cellular structure.
- **Benefits** - Green technologies and bio engineering solutions reduce carbon emissions.
- Conservation of natural resources during the life cycle (construction and operation period) of the project

4.8 Extended Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)

The extended Pradhan Mantri Surakshit Matritva Abhiyan has been recently launched by the Ministry of Health & Family Welfare (MoHFW).

- **Launch year**- 2016
- **Nodal agency**- Ministry of Health & Family Welfare.
- **Objectives**- To improving the quality and coverage of Antenatal Care (ANC) including diagnostics and counselling services as part of the Reproductive Maternal Neonatal Child and Adolescent Health (RMNCH+A) Strategy.
- To provide free, comprehensive antenatal care on the 9th of every month to all pregnant women in their 2nd/3rd trimesters at designated public health facilities by medical officers.
- **Beneficiaries** - Special focus on adolescent and early pregnancies.

- **Activities covered** - *Diagnosing services* for conditions like anaemia, gestational diabetes, and hypertension.
- Providing *nutritional supplements* at health centers.
- *Appropriate birth planning* and complication readiness.
- Identification and *line-listing of high risk pregnancies* based on medical history.
- **Recent changes** – The list of high-risk pregnancy categories is *expanded from 10 to 25*.
- **High Risk Pregnancy (HRP) categories**- HIV, syphilis, severe anemia, pregnancy-induced hypertension, gestational diabetes mellitus, hypothyroidism, tuberculosis, malaria, previous LSCS, cephalo-pelvic disproportion, bad obstetric history, twins/multiple pregnancy, hepatitis B, abnormal fetal heart rate, teenage pregnancy, high fever, RTI/STI, history of stillbirth, congenital malformation, negative blood group, early primi, elderly primi, grand multipara, and short stature.

PMSMA's 'I Pledge For 9' Achievers Awards 'was initiated to recognize the contribution of private sector doctors who volunteered for the PMSMA scheme

4.9 Vigyan Dhara

Recently The Union Cabinet has approved continuation of the 3 umbrella schemes, merged into a unified central sector scheme namely 'Vigyan Dhara' of Department of Science and Technology.

- **Objective** - To promote S&T capacity building as well as research, innovation and technology development towards strengthening the Science, Technology and Innovation ecosystem in the country.
- Strengthen the S&T infrastructure of the country by fostering well-equipped R&D labs in the Academic Institutions.
- **Nodal Ministry** – Union Ministry of Science and Technology.
- **Three Components of Vigyan Dhara**
 - Science and Technology (S&T) Institutional and Human Capacity Building
 - Research and Development
 - Innovation, Technology Development and Deployment
- **Merge** - These three schemes have been merged into the unified scheme 'Vigyan Dhara'.
- **Objective of Merge** - To enhance efficiency in fund utilization and establish synchronization among the sub-schemes/programs.
- **Features** - *Strengthen the S&T infrastructure* of the country by fostering well-equipped R&D labs in the Academic Institutions.
- Promote research in areas such as basic research with access to the international mega facilities
- Encourage *translational research* in sustainable energy, water, etc.
- Building critical human resource pool to strengthen the science and technology landscape.
- *Expand the R&D base* of the country towards improving the Full-Time Equivalent (FTE) researcher count.
- Focused interventions to *enhance the participation of women* in the field of S&T with the ultimate goal of bringing gender parity in Science, Technology and Innovation (STI).
- Reinforce the efforts of the government towards *promoting innovations at all levels*, starting from school level to higher education, Industries and Startups through targeted interventions.
- Significant support to *increase collaboration* between academia, Government, and also with industries.
- Support *collaborative research* through international bilateral and multilateral cooperation.
- **Implementation** - All the programs proposed under this would be aligned with the 5-year goals of DST towards realising the vision of Viksit Bharat 2047.
- The research and development component of the scheme will be *aligned in line with the Anusandhan National Research Foundation (ANRF)*.
- Follow the globally prevailing yardsticks while in alignment with the national priorities.

4.10 Unified Pension Scheme

The Union Cabinet has recently approved the Unified Pension Scheme (UPS) for central government employees.

- **Aim** – To ensure dignity and financial security, well-being and a secure future for government employees.
- **Assured pension** - 50% of the average basic pay drawn over the last 12 months prior to superannuation for a minimum qualifying service of 25 years.
 - It is to be proportionate for lesser service period upto a minimum of 10 years of service.
- **Assured family pension** - 60% of pension of the employee immediately before her/his demise.
- **Assured minimum pension** – Rs.10, 000 per month on superannuation after minimum 10 years of service.
- **Inflation indexation** - On assured pension, on assured family pension and assured minimum pension.
 - Dearness Relief based on All India Consumer Price Index for Industrial Workers (AICPI-IW) as in case of service employees.
- **Lump sum payment** - At superannuation in addition to gratuity
 - 1/10th of monthly emoluments (pay + DA) as on the date of superannuation for every completed six months of service.
 - This payment will not reduce the quantum of assured pension.
- **Eligibility** - Existing and future employees have the option of joining the [New Pension Scheme](#) (NPS) or UPS.
 - The choice, once exercised, will be final.
 - Provisions of the UPS would also apply to past retirees of the New Pension Scheme.
- **Government Contribution** - Government's contribution has also been increased from 14 to 18.5%.
- **Implementation** - The scheme will come into effect from April 1, 2025.

In 2023, government had set up a committee led by T V Somanathan to explore ways to improve pension benefits under National Pension Scheme without reverting to the non-contributory Old Pension System (OPS).

4.11 Recent changes in UDAN scheme

The union government has launched Ude Desh ka Aam Nagrik (UDAN) scheme version 5.4 of scheme.

- UDAN (Ude Desh Ka Aam Nagrik) is a regional airport development scheme launched in April 2017.
- **Aim** - To make air travel affordable and widespread, particularly in remote and underserved regions of the country.
- **Nodal Ministry**- Union Minister for Civil Aviation.
- The scheme is part of the broader National Civil Aviation Policy (NCAP) and focuses on enhancing air connectivity to Tier 2 and Tier 3 cities.
- **Objective** - To connect small and medium cities with big cities through air service.
- **Funding** - Under the UDAN scheme, the airfare for a one-hour journey by a 'fixed wing aircraft' or half an hour's journey by a helicopter for about 500 km, has been fixed at Rs.2500/-.
- The government compensates in the form of Viability Gap Funding (VGF) to airlines for losses due to low fares.

India is the world's third-largest market in aviation sector.

4.12 UDAN 5.4

- The government will look to operationalize 12 additional airports under UDAN.
- This includes new airports in 8 states and Union Territories, covering diverse locations from Shibpur in Car Nicobar to Ambikapur in Chhattisgarh.
- **Relaxed norms of the Directorate General of Civil Aviation (DGCA)** – There will be no need for a wardrobe license, and compliance requirements have also been reduced.
- Water dromes are for landing and take-off of seaplanes.

- The extension of the Viability Gap Funding (VGF) under the RCS to seaplane operations would provide the initial fillip to the Operators.
- **Seaplanes** - They are amphibian aircraft that can take off and land on the sea.
- **Regulatory framework for seaplane operations** – It was established in 2008, is now completed.
- Seaplanes imported for non-scheduled operator permit (NSOP) operations incur duty of less than 5%.

4.13 GREAT scheme

The 8th Empowered Programme Committee (EPC), Ministry of Textiles meeting held recently approved GREAT scheme.

- **GREAT** - 'Grant for Research & Entrepreneurship across Aspiring Innovators in Technical Textiles (GREAT)' scheme.
- **Aim-** To foster entrepreneurship and innovation in the space of **technical textiles**.
- **Scheme-** GREAT scheme is a part of **National Technical Textiles Mission (NTTM)**.
- **Nodal ministry-** Ministry of Textiles.
- **Funding-** Grant-in-aid of **upto 50 Lakhs** for a period of **upto 18 months** will be given under this scheme.
- It provides an additional **10% funding** to incubators supporting these startups.
- **Incubators** - IITs, NITs, Textiles Research Associations, and Centres of Excellence.

The National Technical Textiles Mission (NTTM) is an initiative launched to promote and enhance the production, usage, and export of technical textiles in the country.

Technical textiles

- Technical textiles are a specialized category of textiles designed primarily for their technical performance and functional properties rather than aesthetic or decorative purposes.
- Technical textiles are used individually or as a component/part of another product.
- They are also used as accessories in processes to manufacture other products like filter fabric in food industry or paper maker felt in paper mills.
- **Segments** - Agro-textiles, Building-textiles, Cloth-textiles, Geotextiles, Home-textiles, Industrial-textiles, Medical-textiles, Mobile-textiles, Oeko-textiles, Packaging- textiles, Protective-textiles, Sports-textiles, etc.
- **Monitored by** - Steering Committee for Growth and Development of Technical Textiles (SCGDTT).
- **Other schemes** -Scheme for Growth and Development of Technical Textiles (SGDTT), Technology Upgradation Fund Scheme (TUFS).
- **Technical textile status in India** - India's technical textiles market is the **5th largest globally**, expanding at a CAGR of 8-10% over the past 5 years.
- In 2021-22, the market size reached US\$ 21.95 billion, with US\$ 19.49 billion in domestic production and US\$ 2.46 billion in imports.
- The Indian technical textile industry is estimated to reach a **market size of \$309 Bn by 2047**.

- **Eligibility**
 - **Startups** - Early-stage startups in the technical textiles sector.
 - **Researchers** - Individual researchers and research groups from recognized institutions.
 - **Entrepreneurs** - Aspiring entrepreneurs with innovative ideas in technical textiles.
- **Supporting areas** - GREAT supports innovations under application areas in **all segments** of Technical Textiles.

4.14 National Industrial Corridor Development Programme

The Cabinet Committee on Economic Affairs has approved 12 new project proposals under the National Industrial Corridor Development Programme (NICDP).

- **NICDP** – It is India's most ambitious infrastructure programme.
- **Aim-** To transform the industrial landscape by creating a network of industrial nodes & new industrial cities as "Smart Cities" and to converge next generation technologies.
- **Mission** - To make India, a global manufacturing and investment destination using a high-capacity transportation network.
- **Vision** - Creation of state-of-the-art world class infrastructure to promote local commerce, enhance investment, generate employment and attain sustainable development.
- **Budgetary allocation** – It is estimated about **₹28,602 crore**.
- **Coverage** – It spans across **10 states** and strategically planned along **6 major corridors**.
- **Implementation** – It is monitored by Apex monitoring Authority with Finance Minister as Chairperson.
- National Industrial Corridor Development Corporation Limited (NICDC), a special purpose vehicle is the implementing agency.
- National Industrial Corridor Development and Implementation Trust (NICDIT) to carry out the project development and implementation activities.
- **Projects** – Already completed of four projects, with another four currently under implementation.
- **Importance** - Attracts investments from large industries and MSMEs, towards achieving \$2 trillion in exports by 2030.
- The New industrial cities will be developed as green field smart cities with features like 'plug-n-play' and 'walk-to-work' concepts.
- It will integrate with the PM Gati Shakti and align with the vision of 'Viksit Bharat' and will bolster India's position in Global Value Chains.
- It is expected to generate approximately 1 million direct jobs and up to 3 million indirect jobs through planned industrialization.
- They prioritize sustainability, using ICT-enabled utilities and green technologies to reduce environmental impact.

12 new projects under NICDP	
Location	State
Khurpia	Uttarakhand
Rajpura- Patiala,	Punjab
Dighi	Maharashtra
Palakkad	Kerala
Agra and Prayagraj	Uttar Pradesh
Gaya	Bihar
Zaheerabad	Telangana
Orvakal and Kopparthi	Andhra Pradesh
Jodhpur-Pali	Rajasthan

PM Gati Shakti, a National Master Plan for Multi-modal Connectivity for seamless movement of people, goods, and services.

4.15 Unified Lending Interface (ULI)

At the Global Conference on Digital Public Infrastructure and Emerging Technologies, the RBI Governor announced that the central bank is set to launch the Unified Lending Interface (ULI) across India soon.

- **ULI**- It aims to transform India's lending sector, like how the Unified Payments Interface (UPI) revolutionized the payments ecosystem.
- It is a standardized, **plug-and-play system** to reduce the need for extensive documentation from borrowers.
- It is designed to address unmet credit demand, particularly for agriculture and MSMEs by digitizing access to data like land records.
- **Objective-** It is designed to provide lenders with consent-based digital access to both financial and non-financial customer data, stored across various silos, to **facilitate frictionless credit**.
- This is particularly aimed at aiding farmers and Micro, Small, and Medium Enterprises (MSMEs).

- **Benefits of ULI** - It will greatly *reduce the credit appraisal time* taken by consolidating data scattered across different government, local authority, and banking databases.
- ULI's architecture, featuring common and standardized APIs, will simplify the integration process for lenders, resulting in *faster and more efficient credit delivery* without the need for extensive documentation.
- **Integration with Existing Digital Infrastructure**- ULI will join the 'new trinity' of JAM (Jan Dhan, Aadhaar, Mobile) and UPI, marking a revolutionary step forward in India's digital infrastructure.

Quick facts

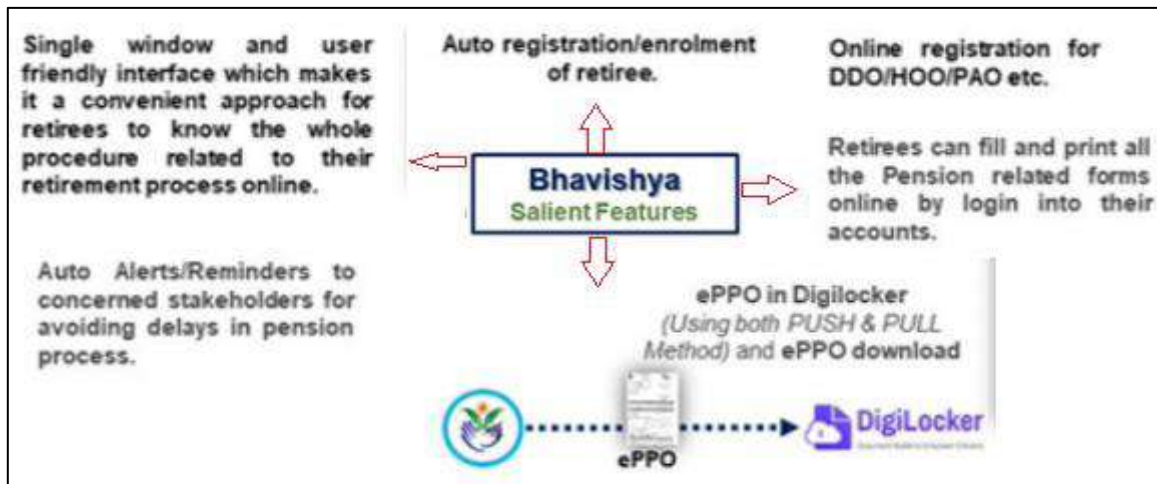
- **Unified Payments Interface (UPI)** - It is a real-time payment system launched in India in 2016 by the National Payments Corporation of India (NPCI).
- It integrates multiple bank accounts into a single mobile application, simplifying various banking features, fund routing, and merchant payments.
- **Central Bank Digital Currency (CBDC)** - It is a digital currency issued by a central bank.
- It is also called digital fiat currency or digital base money.
- It is also a liability of the central bank and denominated in the sovereign currency, as is the case with physical banknotes and coins.
- **Public Tech Platform for Frictionless Credit (PTPFC)** - It aims to develop an open-source, public digital infrastructure to enable seamless flow of credit to various sectors of the economy, especially small businesses and farmers.
- It was by the Reserve Bank Innovation Hub (RBIH), a wholly owned subsidiary of the central bank.
- It will enable the disbursement of non-collateral based loans for Micro, Small and Medium Enterprises (MSMEs), Kisan Credit Card loans up to Rs 1.6 lakh, dairy loans, personal loans, and home loans.

4.16 BHAVISHYA

Recently, the Department of Pension & Pensioners' Welfare introduced 'Bhavishya'.

- It is a comprehensive online platform launched by the Government to facilitate the **pension sanction and payment process** for retiring central government employees.
- It is part of the **Digital India initiative**, aimed at enhancing pensioners' ease of living by ensuring timely and accurate disbursement of pensions.
 - It has been ranked 3rd best in NeSDA (National e-Governance Service Delivery Assessment), 2021.
- **Objectives**
 - Retirees should get all the retirement benefits on time
 - Timely processing of cases at each level.
 - Alerts, Reminder & Notifications to concerned stakeholders for every action due & performed.
 - Online tracking of pension cases at retiree level.
 - Guide the retirees to fill in the forms as per CCS Pension Rules and take the necessary steps related to his/her retirement process on time.
 - Dignified life for pensioner
- **Nodal agency**- Ministry of personnel, public grievances and pensions
- **Key features**- Tracking System, SMS and Email Alerts, e-Sanction, 24x7 Access, Digi locker.
- **Stakeholders**-
 - Individual (Retiree & Pensioner)
 - Drawing & Disbursing Officer (DDO)
 - Head Of Office (HOO)
 - Pay & Accounts Office (PAO)
 - Directorate of Estates (DoE)

- Central Pension Accounting Office (CPAO)
- Pension Disbursing Banks



5. INTERNATIONAL RELATIONS

5.1 U.S. – India Civil Nuclear Agreement

Union Minister recently chaired bilateral meeting on US-India Civil Nuclear Commerce

- It is a **legally binding** agreement between the United States and India that establishes a framework for peaceful nuclear cooperation in 2005.
- **123 Agreements** - It is also known as 123 Agreement. 123 Agreements are a prerequisite for nuclear deals between the US and other countries.
- The agreements are based on Section 123 of the United States Atomic Energy Act of 1954, which is titled "Cooperation with Other Nations".
- **Criteria**
 - To legally obligate our partners to observe specific standards in a multitude of areas including peaceful uses.
 - International Atomic Energy Agency (IAEA) safeguards (technical measures through which the IAEA seeks to verify that nuclear material is not diverted from peaceful uses)
 - Physical security of nuclear materials and prohibitions on enriching, reprocessing, and transfer of specific material and equipment without our consent.
- **Civilian nuclear facilities** - India agrees to allow inspectors from the International Atomic Energy Association (IAEA), the United Nations' nuclear watchdog group, access to its civilian nuclear program.
- The IAEA Board of Governors approved India's safeguards agreement, paving the way for India's consideration at the Nuclear Suppliers Group in 2008.
- **Nuclear weapons** - The deal recognizes **India as a nuclear weapons state**, which was a landmark occasion as the U.S. had imposed sanctions on India since 1974 after its first nuclear weapons testing.
- **Energy** - The deal is about partnering with India on its energy, and it could set the stage for India to emerge as a global power.
- **Outer space cooperation** - The deal also includes a plan for cooperation in outer space.
- As part of the overall initiative,
 - India will expand international safeguards,
 - Adhere to international nuclear and missile export guidelines,
 - Continue its voluntary moratorium on nuclear testing, and
 - Ensure that all civil nuclear trade will be used only for peaceful purposes.

5.2 '2+2' dialogue of India and Japan (International Relations)

Recently, India and Japan held the 3rd edition of the "2+2" Foreign and Defence Ministerial Dialogue.

- **Objective-** The dialogue focused on deepening defence cooperation and ensuring a ***free, open, and rules-based Indo-Pacific*** amidst China's growing military presence in the region.

Key Outcomes of the meeting

- **ASEAN Outlook on the Indo-Pacific (AOIP)** - Both the countries strongly supported ASEAN's unity and the ASEAN Outlook on the Indo-Pacific (AOIP).
- It emphasizes principles like openness, transparency, inclusivity, and respect for international law.
- **Special Strategic and Global Partnership-** It aims to strengthen bilateral security and defence cooperation under Japan's 2022 National Security Strategy, recognizing it as a key pillar of the ***Japan-India Special Strategic and Global Partnership***.
- **Women, Peace, and Security (WPS)** - Emphasized the role of women in conflict prevention and peacebuilding, welcoming increased participation in peacekeeping operations.
- **Defence Cooperation-** India aims to become a developed nation by ***2047***, with a strong focus on building domestic defence capabilities.
- It discussed future cooperation in space, cyber, and defence equipment and technology, and explored coordination for security assistance to third countries.
- **Quad Cooperation-** The meeting valued the cooperation within the Quad and committed to advancing it further for both the countries.
- **Defence Exercises-** It commended the progress in defence ties since September 2022, highlighting Japan's first air visit, participation in ***Tarang Shakti, and the 'Veer Guardian 2023' exercise***.
- They agreed to reaffirm the importance of multilateral defence efforts in the Indo-Pacific and their commitment to ongoing exercises like ***Dharma Guardian, JIMEX, and Malabar***.
- **Significance-** The "2+2" dialogue is aimed at further deepening ***bilateral security and defence cooperation*** between India and Japan.
- It is a strategic plan adopted by the Association of Southeast Asian Nations (ASEAN) in 2019.
- The defence partnership with Japan is seen as crucial for ensuring freedom, inclusivity, and transparency in the Indo-Pacific region.

India holds ministerial-level dialogues with only a few countries, including the United States, Australia, and Russia.

ASEAN Outlook on the Indo-Pacific (AOIP)

- Aim - To promote cooperation with external partners in the Indo-Pacific region.
- It also aims to address geopolitical tensions and the growing influence of major powers in the region.
- **Principles** - The AOIP's guiding principles include ASEAN centrality and ASEAN-led mechanisms, such as the East Asia Summit (EAS), as platforms for dialogue and implementation of cooperation.
- **Key areas** - The AOIP promotes cooperation in 4 key areas - Maritime cooperation, Economic, Connectivity, and Sustainable development.
- The AOIP also serves as a platform for
 - The public, state-owned enterprises, and private sectors of ASEAN Member States, and
 - ASEAN's external partners to engage in constructive discussions, cooperate on projects, and
 - Enhance collaboration in the Indo-Pacific region.

5.3 Joint Russian- Indian Commission meeting

The 2nd meeting of the Joint Russian-Indian Commission on Cooperation in the Field of Emergency Management was held recently.

- **Origin** - India and Russia had signed the Agreement for cooperation in the field of ***Emergency Management*** during the 11th Indo-Russian Annual Summit held ***in 2010 in New Delhi***.
- **Main areas of co-operation** – Exchange of information, early warning, and assessment of risks.
- ***Conducting joint conferences***, seminars, workshops and training.

- Providing *mutual assistance* in technical facilities and equipment.
- Enhancing *capacity building* in emergency preparedness, prevention and response etc.
- **Regulations** – It was designed in 2013 to determine the structure and procedure of the meeting.
- **1st meeting** – It was held **in 2016 in New Delhi** where, Joint Implementation Plan on cooperation in the field of prevention and elimination of emergencies for 2016-2017 was signed.
- **Joint Implementation Plan 2018-2019** – Signed in 2017.

2nd Joint Russian- India Commission Meeting

- It held in Moscow, Russia in 2024.
- **Key agreement-** A working **plan for 2025-2026** was signed, focusing on cooperation in emergency management.
- **Main areas of cooperation**
 - Use of *space monitoring technologies* for risk forecasting and emergency response.
 - *Exchange of experiences* in responding to large-scale disasters.
 - *Training* of fire and rescue specialists.
 - Joint efforts in emergency management and in educational & research institutions.
- **3rd meeting** – They agreed to conduct the next meeting in India in 2026.

India reaffirmed its commitment to the Sendai Framework for Disaster Risk Reduction and Prime Minister 10-point agenda on Disaster Risk Reduction.

5.4 Security of Supply Arrangement (SOSA)

India and the US have signed two significant agreements as the Indian Defence Minister started his official visit to the US.

- **Security of Supply Arrangement (SOSA)-** It is a *non-binding pact* signed between India and the US to ensure *reciprocal priority support for goods and services* that promote national defence.
- India is the *18th country* to enter SOSA with the US.
 - Other partners include Australia, Canada, Denmark, Estonia, Finland, Israel, Italy, Japan, Latvia, Lithuania, the Netherlands, Norway, the Republic of Korea, Singapore, Spain, Sweden, and the UK.
- **Aim** - Strengthen the defence industrial ecosystem of both countries by enhancing supply chain resilience.
- **Features** - U.S. and India commit to support one another's priority delivery requests for procurement of critical national defense resources.
- US provides India with priority support for critical national defence resources through the *Defence Priorities and Allocations System (DPAS)* mechanism.
- Indian companies to prioritize support for US defence requirements under a *government-industry Code of Conduct*.
- India will draw up a list of domestic companies that will volunteer to undertake a government-industry Code of Conduct to provide military equipment to the US on priority.
- **Benefit** – SOSA is a significant step toward greater defence industry collaboration, with potential for future legally binding agreements like the *Reciprocal Defence Procurement Agreement (RDP)*.
- It will be a key factor in strengthening the Defence Technology and Trade Initiative (DTTI) between the two countries.
- SOSA will make it easier for Indian companies to get priority supplies from the US and revitalise the defence industry cooperation between the two countries.
- **Memorandum of Agreement on Liaison Officers**
 - Facilitates the assignment of Indian Liaison Officers to key US strategic commands.
 - Enhances information sharing and cooperation between the Indian and US armed forces.
- **Strategic Commands and Regional Security**
 - The deployment of Indian officers in US strategic commands is expected to enhance regional security and international cooperation.

- The agreements contribute to the broader Indo-US collaboration on industrial, defence, and security issues.

5.5 BHISHM Cubes

Recently, the Prime Minister of India presented BHISHM Cubes to the Ukraine government during his official visit.

- **BHISHM Cubes-** BHISHM (Bharat Health Initiative for Sahyog Hita & Maitri) Cubes also known as Arogya Maitri Cubes are compact, portable medical units designed to provide first-line care in emergency situations.
- These Cubes are designed to manage various injuries and medical emergencies, making them invaluable in conflict zones or disaster-stricken regions.
- **Development-** The BHISHM Cubes were developed under Project BHISHM and Project Aarogya Maitri, spearheaded by HLL Life Care and the Ministry of Defence.
- **Features-** Each BHISHM Cube consists of medicines and equipment for the first line of care for all kinds of injuries and medical situations.
- It also includes surgical equipment for a basic Operation Room that can manage 10-15 basic surgeries per day.
- It can also generate its own power and oxygen in limited amounts.
- **Essential medicines and equipment-** The cubes are stocked with essential medicines and equipment to treat trauma, bleeding, burns, and fractures, ensuring prompt care for common and urgent medical situations.
- **Critical care facility-** These cubes provide critical care for 100 survivors for 48 hours, equipped with operation theatres, mini-ICUs, ventilators, blood testing, X-ray machines, and a cooking station.
- **Technological Integration-** They integrate AI and data analytics to enhance disaster response, coordination, real-time monitoring, and efficient management of medical services during emergencies.

Project Aarogya Maitri

- Project Aarogya Maitri, also known as Project BHISHM, is an initiative by the Ministry of Defence.
- It is aimed at providing medical supplies to developing nations affected by humanitarian crises or natural disasters.
- This project is designed to offer timely and effective medical aid where it is most needed.
- The project is equipped with Aarogya Maitri Sahayata Cube, the world's first portable disaster hospital.
- These cubes are engineered to treat up to 200 casualties and can be deployed within 12 minutes of arriving at the disaster site.
- They can be packed into 72 components, which can be transported by hand, bicycle, or drone, making them highly versatile and accessible in various emergency scenarios.

6. ECONOMY

6.1 Bhartiya Beej Sahkari Samiti Limited (BSSSL)

Recently, the Ministry of Cooperation has set up Bhartiya Beej Sahkari Samiti Limited (BSSSL) under the Multi-State Cooperative Societies (MSCS) Act, 2002.

- It is primarily focused on seed production and distribution to support agricultural practices across multiple states in India.
- **Nodal agency-** Ministry of Cooperation.
- **Promoted by -** IFFCO, KRIBHCO, NAFED, National Dairy Development Board (NDDB) and NCDC.
- It set up under the Multi-State Cooperative Societies (MSCS) Act, 2002.

- **Functions-** It will undertake the production, procurement & distribution of quality seeds under a single brand through a network of cooperatives.
- The cooperatives will improve crop yield and develop a system for preservation and promotion of indigenous natural seeds.
- It will help increase the seed replacement rate and variety replacement rate by ensuring farmers' role in producing certified seeds.
- **Focus-** This society will focus on producing, testing, certifying, procuring, processing, storing, branding, labelling, and packaging foundation and certified seeds.
- Breeder seeds will be sourced from Public Sector Research Organizations and International Research Institutes like ICRISSAT, IRRI, and CIMMYT.
- This will be done through Primary Agricultural Credit Societies (PACS), leveraging various government schemes and policies using a 'Whole of the Government Approach'.
- **Significance-** It will increase the
 - Production of quality seeds in India through cooperatives,
 - Reducing dependence on imports,
 - Enhancing agricultural production,
 - Boosting the rural economy,
 - Promoting Make in India (Atmanirbhar Bharat).

The share of India's domestic seed trade in the global market is only 4.5%.

6.2 Price Monitoring System (PMS) version 4.0

Union Food and Consumer Affairs Ministry has launched the Price Monitoring System (PMS) Version 4.0 and Mobile App.

- **Price Monitoring System** – It monitors prices of selected essential commodities.
- **Ministry** - Consumer Affairs, Food and Public Distribution.
- It monitors retail and wholesale prices and spot and future prices of selected essential commodities daily.
- It implements commodity-specific market intervention schemes in the event of shortage and to control prices.
- Civil Supplies Departments of 34 States/UTs provide information on 550 market centers.
- **Monitored Commodities – 38**
 - **Earlier 22** - Rice, Wheat, Atta, Gram Dal, Tur (Arhar) Dal, Urad Dal, Moong Dal, Masur Dal, Sugar, Gur, Groundnut Oil, Mustard Oil, Vanaspati, Sunflower Oil, Soya Oil, Palm Oil, Tea, Milk, Potato, Onion, Tomato and Salt.
 - **16 new commodities under Version 4** - Bajra, Jowar, Ragi, Suji (wheat), Maida (wheat), Besan, Ghee, Butter, Brinjal, Egg, Black Pepper, Coriander, Cummin seed, Red chilies, Turmeric powder and Banana.
 - The new commodities will be monitored from 1st August 2024.
- The 38 commodities constitutes close to 31% of the total CPI weights.
- **Benefit of Monitoring** - Facilitate policy interventions to stabilize price volatility in food items and to control the overall inflation.
- **Price Monitoring System (PMS) mobile app** - It is a tool designed to track and analyze pricing data for products across various retailers.
- It helps users to monitor price changes in real-time, compare prices, and receive alerts for price drops or promotions, making it easier to make informed purchasing decisions.

6.3 Rural Youth Employment Report, 2024

The 'State of Rural Youth Employment Report 2024' was released recently.

- **Released by - Development Intelligence Unit**, a joint initiative by Transform Rural India and Sambodhi Research, and the Global Development Incubator.
- 5169 rural 'Opportunity Youth' from 21 states across India between 18-35 years of age were interviewed.

Opportunity Youth are youth who are active and inactive, unemployed, underemployed, and out of school/education / skilling.

Key Findings of the report

- **Age group** - Among the respondents, 26.6% were aged between 18-25 years and the remaining 73.4% were aged between 26-35 years.
- **Working population**
 - **Male** - Of these, just over half of the male respondents aged 18-25 years were currently working.
 - Among older male youth aged between 26-35 years, nearly 85% said they were engaged in paid work, and nearly 10% said they used to work but were currently unemployed.
 - **Female** - In contrast, only a fourth of female respondents in the same age group said they were currently engaged in paid work.
 - By contrast, among female youth in the same age group only 40% said they were currently working, a fourth reported having dropped out of the workforce, and a third reported never having worked for pay.
- According to the Directorate General of Labour, Ministry of Labour and Employment 32.8% females aged 15 years and above in India are participating in the labor force, as compared to 77.2% males.
- Female Labour Force Participation Rate (LFPR) in the age group 15-59 years is 35.6%, as compared to 81.8% male.
- **Primary sources of income**- Nearly half of rural youth rely on agriculture, followed by wage labor and retail trade.
- **Higher Job dissatisfaction** - A significant majority between 70-85% of currently employed rural youth are looking to change their jobs.
- **Preferred employment types** - Many youths prefer small businesses (manufacturing, retail, trading) or salaried jobs in public and private sectors.
- Salaried jobs across the public and private sectors were the clear second preference, with teaching, clerical work, and working in a factory being top job preferences across gender and age group.
- Younger male youth prefer government or private sector jobs, and women prefer government jobs.
- **Support needs**- For starting businesses, 90% of male and 50% of female respondents need support accessing seed capital, and 10% need full training courses.
- **Location preferences**- Over 60% of male and 70% of female respondents prefer to work in or near their villages, even at lower incomes.
- **Employment rates**- Higher for males compared to females in both the 18-25 and 26-35 age brackets.

6.4 Wholesale Price Index (WPI) for July 2024

Recently Index Numbers of Wholesale Price in India for July, 2024 has been released.

- **Wholesale Price Index (WPI)** – It is a measure of changes in the prices of goods sold and traded in bulk by wholesale businesses to other businesses.
- **Components of WPI** - WPI is calculated by taking a weighted average of prices in a basket of goods.
- **WPI Released by** - Office of Economic Adviser

WPI Components	
Commodity Group	Weightage (%)
Primary Articles	22.62
Fuel & Power	13.15
Manufactured Products	64.23

- **Department** - Department for Promotion of Industry and Internal Trade DPIIT
- **Nodal Ministry** - Ministry of Commerce and Industry.
- DPIIT releases the index number of wholesale prices in India on monthly basis on the 14th of every month (or the next working day) with a time lag of two weeks of the reference month.
- **Consumer Price Index (CPI) released by** - National Statistical Office (NSO), Ministry of Statistics and Programme Implementation.
- Annual Rate of WPI inflation in July 2024 over July 2023 - **2.04 % (Provisional)**.
- Annual rate of inflation change for the last three months.
- Monthly WPI change in July 2024 over June 2024 - **0.84%**.
- Monthly change of WPI inflation for last three months.
- **Major reason for Increase in Inflation in July** - Increase in prices of food articles, manufacture of food products, mineral oils, crude petroleum & natural gas, other manufacturing etc.
- **WPI Food Index (Weight 24.38%)** – It measures the movement of wholesale prices of food articles.
- It consisting of 'food articles' from primary articles group and 'food product' from manufactured products group.
- The rate of inflation (Y-o-Y) based on WPI Food Index decreased from 8.68% in June, 2024 to 3.55% in July.

6.5 Committee of Creditors

The recently Insolvency and Bankruptcy Board of India (IBBI) has issued guidelines for the Committee of Creditors (CoC).

The Insolvency and Bankruptcy Board of India is the regulator for overseeing insolvency proceedings in India. It was established in 2016 under the [Insolvency and Bankruptcy Code, 2016](#).

- **Committee of Creditors** - It is a group of people representing a company's creditors during a bankruptcy proceeding.
- It is the higher-level decision-making body in initiating and governing the Corporate Insolvency Resolution Process (CIRP).
- **Formation** – It is formed under the regulation 21 of the IBC Code 2016.
- This committee is majorly responsible for a bankrupted company's future and/or possible reorganization.
- **Composition** - A committee of creditors consists of both secured and unsecured creditors.
 - Secured creditors are associated with credits backed by collateral. An example of a secured creditor is a bank.
 - Unsecured creditors are associated with credits not backed by collateral. Examples of unsecured creditors are contractors and customers.
- **Roles and Responsibilities** - All important decisions are finalized after the approval of committee of creditors.
- Liable to decide about the restoration of the corporate debtor by accepting the resolution plan.
- Appoint insolvency resolution professionals to manage the insolvency process
- Conduct regular meetings in which the rules are discussed for the working of interim resolution professionals.
- Responsible for the evaluation and approval of the resolution plan along with the modification, if any required.
- Once the committee of creditors is confident about the practicality and viability of the proposed resolution plan, they can approve it with the mandate of more than 66% of the vote.

6.6 Foreign Exchange Management (Non-debt Instruments) Amendment Rules, 2024

In pursuance of the Union Budget 2024-25 announcement, Department of Economic Affairs has amended the Foreign Exchange Management (Non-debt Instruments) Rules, 2019.

- Foreign Exchange Management (Non debt Instruments) Rules, 2019 was issued under **Foreign Exchange Management Act, 1999**.

- **Aim** - It aims to regulate the investment by foreign entities in non-debt instruments of Indian entities.
- Non-debt instruments consist of
 - All equity investment instruments in incorporated entities: public, private, listed, and unlisted
 - capital participation in Limited Liability Partnerships.
 - All instruments of investment recognized in the FDI policy.
 - Investment in units of Alternative Investment Funds (AIFs), Real Estate Investment Trusts (REITs), and Infrastructure Investment Trusts (InvIts).
 - Investment in units of mutual funds or Exchange-Traded Fund (ETFs).
 - Acquisition, sale or dealing directly in immovable property.
 - Contribution to trusts
 - Depository receipts issued against equity instruments
- **The Amendments**
- The transfer of equity instruments of an Indian company between a person resident in India and a person resident outside India by way of
 - Swap of equity instruments
 - Swap of equity capital of a foreign company
- Enabling Foreign Direct Investment (FDI) in White Label ATMs to boost financial inclusion nationwide.
- Harmonizing the definition of Startup Company with the definition of Department for Promotion of Industry and Internal Trade.
- **Aim of the amendments** - To Simplify rules and regulations for Foreign Direct Investment and Overseas Investment.
- **Objectives** - To simplify cross-border share swaps for greater Ease of Doing Business.
- To provide for the issuing or transferring of Indian company equity instruments in exchange for foreign company equity instruments.
- **Benefits of Amendment** - Facilitate the global expansion of Indian companies through mergers, acquisitions, and other strategic initiatives
- Enabling Indian companies to reach new markets and grow their presence worldwide.

7. AGRICULTURE

7.1 National Pest Surveillance System (NPSS)

The Union Agriculture and Farmers Welfare Minister recently launched the National Pest Surveillance System (NPSS).

- **NPSS**- It is an AI-based system aimed at helping farmers manage pests by connecting them with agriculture scientists and experts through mobile phones.
- The system includes a user-friendly mobile app and web portal for all farmers.
- **Aim**- It is designed to reduce farmers' dependence on pesticide retailers and promote a scientific approach to pest management.
- **Objective**- To make farmers learn about various insecticides and pesticides to protect their crops from harmful effects.
- **Real-time monitoring**- Using real-time data and advanced analytics, NPSS ensures accurate pest identification, monitoring, and management.
- The NPSS platform used Information and Communication Technology (ICT).
- **Functionality**- Farmers can snap photos of infested crops or insects using their phones and send them to experts for instant analysis and advice using the NPSS.

- **Significance**- The launch of NPSS is a major step in modernizing Indian agriculture, boosting food security, and promoting sustainable farming practices.
- The NPSS system aims to deliver fast, accurate pest identification and control, ensuring the right number of pesticides is used at the right time.
- This increases productivity, reduces pesticide overuse, and preserves soil health.

7.2 NUE rice variety

The scientists have identified major natural variations in rice nitrogen use efficiency (NUE), along with key traits and genes linked to this efficiency.

- **Nitrogen use efficiency (NUE)** - It's the ratio between grain yield or nitrogen uptake by plants to the amount of urea used as input.
- On average, rice plants use only 20–50% of the nitrogen fertilizer applied to them.
- **Significance** - It is used to measure how well rice plants use nitrogen and is crucial for reducing fertiliser waste and environmental pollution.
- **Economic Impact** - Poor NUE causes fertiliser waste worth Rs 1 lakh crore annually in India and \$170 billion globally.
- **Environmental Impact**- Less NUE crops cause greenhouse gas emissions and eutrophication in water bodies.
- **Benefits of High NUE varieties** - Enhanced agricultural sustainability by lowering fertiliser input costs, increased farmer productivity and profitability, and reduced environmental pollution.

NUE rice varieties

- **Long duration High NUE rice** - Khira and CR Dhan 301.
- **Short duration High NUE rice** - Dhala Heera variety.
- Short duration high NUE varieties are better than long duration varieties.

India is a signatory to the Kunming-Montreal Global Biodiversity Framework (2022), which mandates countries to halve their nutrient waste from all sources by 2030.

7.3 Self-Reliance in P&K fertilizer

Recently, the government has been committed to making the country self-reliant in the production of Phosphorus and Potassium (P&K) fertilizers and is taking several steps towards this goal.

- **Components**- **Potash (K)** and **phosphate (P)** are essential for increasing the production of foodgrains and other agricultural products, along with **nitrogen (N)**.
- **Ideal ratio**- A NPK ratio of **4:2:1** is considered ideal and accepted for macro-level monitoring of plant nutrient consumption for the country.
- **Decontrol of P&K Fertilizers in 1992**- It allowed market forces to dictate prices.
- **Production**- Currently, India's fertilizer production is 42-45 million tonnes while imports are around 18 million tonnes.
- **Imports**- During 2021-22, the total value of fertilizer imports, inclusive of inputs used in domestic production, was 24.3 billion dollars.
- **Current status on Imports of India**
 - **Potash (K)** - Depends entirely on imports from Belarus, Canada, Russia, Israel, and Jordan.
 - **Import** - Import dependence is almost 80%-90%, with imports coming mainly from China, Saudi, Morocco, Jordan and Egypt.
- **Auctioning of blocks**- The government has enacted laws to auction critical mineral blocks like potash and phosphate for exploration and processing in India.

The PV Narasimha Rao government removed subsidies on non-urea fertilizers (P and K) but retained control and subsidy on urea.

Types of P&K Fertilizers

- **Diammonium Phosphate (DAP):** Widely used phosphorus fertilizer.
- **Muriate of Potash (MOP):** Key source of potassium.
- **NPK Complex Fertilizers:** Combination of nitrogen, phosphorus, and potassium in varying ratios.
- **Single Super Phosphate (SSP):** Source of phosphorus.

Government Steps for Self-Reliance in Fertilizer Production

- Permissions granted to fertilizer companies to increase manufacturing capacity under Nutrient Based Subsidy (NBS).
- The policy provides a fixed subsidy on each grade of subsidized P&K fertilizers based on nutrient content.
- New Investment Policy (NIP) to facilitate fresh investments and set up 6 new urea units.
- Promotion of Organic Fertilizers under the GOBARdhan initiative.
- The use of liquid nano DAP (diammonium phosphate) and nano urea is being promoted to reduce imports.

8. ENVIRONMENT

8.1 Miombo forest

The FAO and AICS have signed two agreements to protect the miombo forest and boost trade in the Mozambique-Zimbabwe border region.

- **About-** It is named after the Swahili word for the dominant *Brachystegia* tree species.
- **Location-** Primarily in Central Africa.
- **Area-** Approximately 2.7 million square kilometers.
- **Dominant trees-** *Brachystegia* and *Julbernardia* species
- **Bordering countries-** Angola, Democratic Republic of the Congo, Malawi, Mozambique, Tanzania, Zambia, Zimbabwe.
- **Climate-** Ranges from humid to semi-arid, and tropical to subtropical or even temperate.
- **Soils-** Soils of the Miombo woodlands are generally nutrient-poor.
- **Flora** - It is home to over 8,500 plant species, with 54% being endemic.
- **Fauna-** It also provides habitat for a diverse range of wildlife including elephants, rhinos, giraffes, antelopes, lions, and over 1,000 bird species.
- **Importance-**
 - Provides essential resources, supports biodiversity, and maintains the Greater Zambezi River basin.
 - Providing 70-90% of all energy consumed in southern Africa as fuelwood or charcoal.
 - Supplying about 90% of all energy consumed in Tanzania.
- **Threats-**
 - Trees are being cut for charcoal, firewood, tobacco curing, and farmland expansion.
 - **Wildfires** lead to deforestation and degradation.
 - Illegal hunting, especially for rhino horn and elephant ivory, is a major threat.

8.2 National Plan for Conservation of Aquatic Ecosystems (NPCA)

The central government is implementing the National Plan for Conservation of Aquatic Ecosystems (NPCA) to conserve and manage wetlands nationwide.

- **NPCA** – It is a conservation program for wetlands and lakes.
- **Formation** – It is formed by merging the

- National Lake Conservation Plan
- National Wetlands Conservation Programme
- **Objectives** – To holistically *conserve and restore the wetlands* for achieving the desired water quality enhancement, besides improvement in *biodiversity and ecosystems*.
- **Mode** – It is a *centrally sponsored scheme*.
- Central assistance is provided *based on state government proposals*, aligned with guidelines and *budget availability*.
- **Regulated by**- The *Wetlands (Conservation and Management) Rules, 2017*, established under the Environment (Protection) Act, 1986.
- **Implemented by**- Ministry of Environment, Forest and Climate Change.
- **NPCA Guidelines** – To facilitate implementation of NPCA by outlining the different steps to be undertaken for preparing and submitting plans before implementation.
- **Activities covered** - Wastewater treatment, shoreline protection, lakefront development, desilting, storm water management, bioremediation, catchment area treatment, Lake Beautification, survey and demarcation, bio-fencing, fisheries development, weed control, biodiversity conservation, education, and community participation.

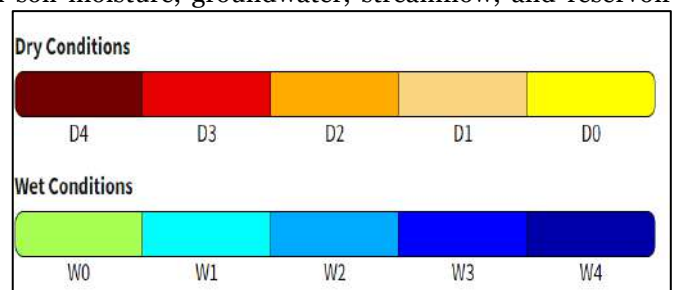
‘Wetlands Rejuvenation’ programme

- It aims on *Restoration & Rejuvenation of at least 100 major wetlands* across the country.
- It is structured based on 4 pronged approach.
- **Wetland Brief Document** - Developing baseline information
- **Wetland Health Card** - Rapid assessment of wetlands condition
- **Wetlands Mitras** - Stakeholder platforms to enable collaborative and participatory management
- **Wetland Integrated Management Plan** - Management planning addressing wetlands’ biodiversity and ecosystem services, values and threats.
- In continuation to the first cycle, it is now being scaled up to 1,000 wetlands, reaching out to all districts of the country.

8.3 Standardized Precipitation Index (SPI)

The India Meteorological Department (IMD) has used the Standardized Precipitation Index (SPI) to study trends in precipitation and drought conditions across India.

- **SPI** – It is a **drought index** that measures how observed precipitation compares to the long-term average over a given time (e.g. over the last 30 or 60 days).
- It can also be used to measure drought impacts on soil moisture, groundwater, streamflow, and reservoir storage.
- **Calculation** – It is calculated by dividing the difference between the observed precipitation and the long-term average by the long-term standard deviation of precipitation for that period.
- **Time Scales**- The SPI is calculated for a selection of time scales, including 1, 2, 3, 6, 9, and 12 months.
- **Developed by** - T. B. McKee, N.J. Doesken, and J. Kleist in 1993.
- It uses a legend to indicate drought conditions, with D4 representing **exceptional drought**, D3 representing extreme drought, D2 representing severe drought, and D1 representing moderate drought.
- **Transformation**- Precipitation data is transformed using probability distributions like gamma or Pearson III to fit a normal distribution.
- **SPI Values**
 - **Positive SPI** – It indicates wet conditions (greater than median precipitation).



- **Negative SPI** – It indicates dry conditions (less than median precipitation).

8.4 Ramsar sites

Recently, 3 new wetlands have got the Ramsar site tag taking the total tally of Ramsar wetlands to 85 in India.

- **Wetlands**- Under the Ramsar Convention, a wetland is **any land saturated or flooded with water**, either seasonally or permanently.
- **Inland** wetlands include lakes, rivers, marshes, and ponds, while coastal wetlands cover mangroves, estuaries, and coral reefs.
- Wetlands are referred to as the **“Kidneys of the Earth”**
- The **Wetlands (Conservation and Management) Rules, 2017** excludes river channels, paddy fields, and other areas where commercial activity takes place.

Ramsar Convention

- It is an intergovernmental treaty focused on conserving and wisely using wetlands.
 - It is the only international agreement dedicated to protecting a single ecosystem.
 - **Members**- 172 member countries.
 - **Framed** - Ramsar, Iran, 1971.
 - **Objectives**- Wise use of all their wetlands
 - Designating sites for the Ramsar List of “Wetlands of International Importance” (Ramsar Sites) and their conservation
 - Cooperating on transboundary wetlands and other shared interests
 - **India's membership**: India became a signatory to the convention in 1982.
 - **India's Contribution to Ramsar Sites** – 85 sites
 - **States with Most Ramsar Sites** - Tamil Nadu (18 sites), Uttar Pradesh (10 sites).
 - **Largest site**- Sundarbans is the largest Ramsar Site of India.
 - **Total area**- 1358067.757 ha in the country.
 - **Montreux Record**- The register lists Ramsar wetland sites where ecological changes have occurred, are occurring, or are likely due to technology, pollution, or human activity.
- The 3 new sites included are
 - Nanjarayan Bird Sanctuary in Tamil Nadu
 - Kazhuveli Bird Sanctuary in Tamil Nadu and
 - Tawa Reservoir in Madhya Pradesh.

Nanjarayan Lake

- **Location**- Tiruppur district, Tamil Nadu.
- **Type**- Large shallow wetland.
- **Weather Dependency**- Relies on heavy rainfall from Nallar drainage.
- **Biodiversity**- Hosts 191 bird species, 87 butterfly species, 7 amphibian species, 21 reptile species, 11 small mammal species, and 77 plant species.
- **Ecological Importance**- Feeding and nesting habitat for resident and migratory birds; significant for agriculture.

Kazhuveli Bird Sanctuary

- **Location**- Villupuram district, Tamil Nadu.
- **Type**- Brackish shallow lake.
- **Ecological Importance**- Key stopover for migratory birds on the Central Asian Flyway; breeding ground for resident species.
- **Connectivity**- Linked to Bay of Bengal via Uppukalli creek and Edayanthittu Estuary.

Tawa Reservoir

- **Location**- At the confluence of Tawa and Denwa rivers in Satpura Tiger Reserve in Madhya Pradesh.
- **Ecological Importance**- Habitat for rare and endangered species, birds, and wild animals; vital for aquatic flora and fauna.
- **Biodiversity**- Important habitat for local and migratory birds.

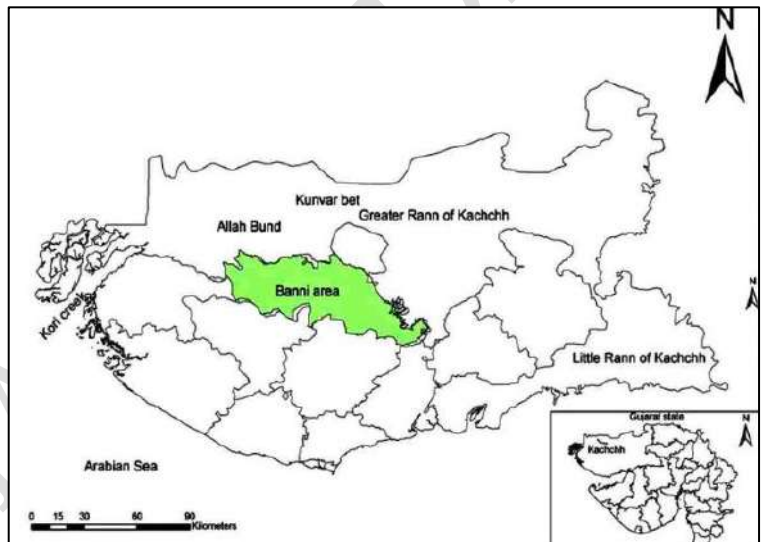
8.5 Banni grasslands

In a new study, researchers have assessed the suitability of different areas of Banni for sustainable grassland restoration, considering ecological value to be the primary criterion.

- **Banni Grasslands** – It is a largest tracts of arid grasslands in Kachchh district in Gujarat.
- It is a unique ecosystem combining wetlands, grasslands, and salt pans.
- They fall under Dichanthium-Cenchrus-Lasiurus type of grass cover.
- Traditionally, they were managed following a system of rotational grazing.
- **Area** - It once covered an area of approximately 3,800 sq. km but it has now decreased to about 2,600 sq. km.

- In **India**, grasslands account for about 24% of the country's total land area.

- **Climate** - Banni is situated in Arid climate, with high temperature up to 48°C -50°C during May and June .
- **Winter** temperature goes down to 5°C – 8°C during December January.
- **Rainfall** - Average Annual rainfall, occurring through Southwest monsoon between June to September, is very low of 317mm with coefficient of variation of 65%.
- **Wetlands** - There have been numerous natural wetlands and the largest one is known as *Chhari – Dhandh*.



- It is a **saucer** shaped wetland which is recently declared as Conservation Reserve.
- **Bio Diversity** - It is home to 192 species of plants, 262 species of birds including native and migratory as well as several species of mammals, reptiles, and amphibians.
- **Flora** - *Salvadora persica*, *Cressa cretica*, *Cyperus* spp, grasses in the genera *Sporobolus*, *Dichanthium*, and *Aristida*.
- **Fauna** - Nilgai , Chinkara, Blackbuck, Wild boar, Golden jackal, Indian hare, Indian wolf caracal, Asiatic wildcat, Desert fox , Indian wild ass.
- **Migratory species** - During rainfall season flamingos, migratory cranes visit here.
- **Cheetah Reintroduction** - Banni Grasslands Reserve and Narayan Sarovar Sanctuary, both in Kutch, have been classified as the last remaining habitats of the cheetah (*Acinonyx jubatus*) in India.
- **Breeding ground** - Many bird species such as the great Indian bustard and the Bengal florican prefer to breed in grasslands.
- **Tribal Communities** - It is home to Sindhi speaking Maldhari (cattle breeders), Halaypotra, Hingora, Hingorja, Jat and Mutwa tribes .
- **Threat** - Degradation due to deforestation, overgrazing, agriculture, urbanisation, tree-based plantation projects, invasive species, and mega-development projects.
- As **much** as 49% of grassland areas worldwide are estimated to be experiencing degradation.
- **Findings of the recent study**
 - The recent study has suggested measures for restoring the grassland.

- Providing them with adequate water sources, either through irrigation or rainwater harvesting.
- Providing supplementary inputs like fertilizers.
- Terracing to protect from high water run-off, erosion and soil intrusion.

8.6 Bharat Zero Emission Trucking (ZET)

The Principal Scientific Adviser (PSA) recently launched the "Bharat Zero Emission Trucking (ZET) Policy Advisory".

- **Zero-emission trucks-** These are vehicles that produce no tailpipe emissions, contributing significantly to reducing greenhouse gas emissions and improving air quality.
- These trucks are primarily powered by either **electric batteries or hydrogen fuel cells**, making them an essential part of the transition to sustainable transportation.
- ZETs are crucial for **decarbonization and energy security**.
- **Bharat Zero Emission Trucking policy-** It is a dynamic document designed to guide India's transition to zero-emission trucking.
- **Aim-** It is initiatives and strategies to promote zero-emission trucking as part of the broader goal to reduce carbon emissions in the transportation sector.
- **Target-** The goal is to reach 100% ZET sales penetration by 2050 to achieve India's Net Zero 2070 target.
- **Focus area-** The document is dynamic, with 30 policy interventions across five key areas i.e. incentives, regulations, infrastructure, business and financing, and stakeholder-centric initiatives.
- **Nodal Agency Responsibility-** It links each policy intervention to a nodal agency responsible for its implementation.
- **Key Stakeholder-** Central Ministries, central and state agencies, Financiers, Private companies, Research Organisation and Labour Union.
- **Development and Oversight-** The development of the advisory was led by a Policy Advisory Panel (PAP) constituted by the Office of the Principal Scientific Adviser (PSA).
- The drafting was done by a Project Management Unit at the Centre of Excellence for Zero Emission Trucking (CoEZET), IIT Madras, under the guidance of the PAP.
- **Strategic Importance-** The advisory is expected to play a crucial role in shaping India's strategy for transitioning to zero-emission trucking, aligning with the country's broader environmental and energy goals.

Tailpipe emissions are the release of pollutants into the atmosphere from the end pipe of a car's exhaust system. These emissions are caused by the combustion of fuel, such as gasoline, diesel, or biofuel.

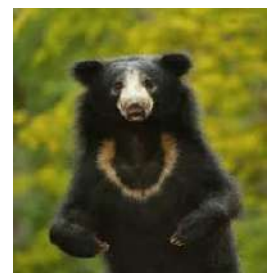
SPECIES IN NEWS

8.7 Charles Darwin's frog

A recent study on sloth bear behaviour during tiger encounters suggests strategies to prevent fatal human attacks.

- The sloth bear also known as the **Indian bear**, is a myrmecophagous bear species native to the Indian subcontinent.
- **Scientific name-** Melursus ursinus
- **Diet-** They are **omnivorous** but primarily feeds on fruits, ants and termites.
- **Physical Characteristics-** Sloth bears have a long, shaggy coat of black fur, a mane around their shoulders, and a whitish, V- or Y-shaped marking on their chest.
- **Behaviour-** They are mostly nocturnal, foraging for food at night and resting during
- **Lifespan-** In the wild, sloth bears can live up to 20 years, while in captivity they may live slightly longer.
- **Habitat-** They prefer tropical and subtropical forests, grasslands, and scrublands.

Myrmecophagous, meaning that they specialize in eating termites and ants.



- They are often found in areas with rocky outcrops and caves, which they use for shelter.
- **Distribution-** Sloth bears are primarily found in India, but their range also extends to Nepal, Sri Lanka, and Bhutan.
- **Conservation Status**
 - **IUCN Red List Status-** Vulnerable
 - **CITES-** Appendix I
 - **Wildlife Protection Act, 1972-** Schedule I

Sloth bears are responsible for more attacks on humans than any other large carnivore, with a notable percentage of these attacks being fatal

8.8 Bent-toed geckos

Scientists from India and the UK have recently discovered 6 new species of bent-toed geckos in Northeast India.

- Bent-toed geckos are a diverse group of geckos known for their distinctive bent or curved toes.
- **Genus-** Cyrtodactylus.
- **Size-** Typically **small to medium**-size.
- **Body-** Their toes are notably bent, which aids in their climbing abilities.
- **Habitat-** They inhabit a variety of environments including forests, rocky areas, and sometimes urban areas.
- **Diversity-** They are predominantly found in Southeast Asia, including countries like **India, Sri Lanka, Thailand, and Malaysia.**
- **Behaviour-** Most are **nocturnal**, meaning they are active during the night.
- **Diet-** They are **insectivorous**, feeding on small insects and other invertebrates.
- **Reproduction-** Bent-toed geckos lay eggs, with the number and size of eggs varying by species.
- They typically lay them in hidden or secure locations.

Details of the discoveries	
Namdapha Bent-Toed Gecko (Arunachal Pradesh)	Found in Namdapha and Kamlang Tiger Reserves, inhabit lowland evergreen forests and are seen near forest streams.
Siang Valley Bent-Toed Gecko (Arunachal Pradesh)	Named after Siang Valley, this species is notable for its distinct biodiversity.
Nengpui Bent-Toed Gecko (Mizoram)	Located in Nengpui Wildlife Sanctuary, characterized by tropical semi-evergreen forests with Dipterocarpus spp. and palms.
Manipur Bent-Toed Gecko (Manipur)	Found near Lamdan Kabui village, perched on shrubs, along the Leimatak-Charoikhullen road.
Barail Hills Bent-Toed Gecko (Nagaland)	Known only from Peren District's Athibung Reserve Forest, in tropical to subtropical cloud forests.
Kiphire Bent-Toed Gecko (Nagaland)	Discovered in subtropical regenerating jhum forest, with the holotype collected from a shrub 2 meters up at night.

8.9 Sturgeon

Sturgeon fish species is being heavily poached & trafficked in the Lower Danube, said World-Wide Fund for Nature (WWF).

- Sturgeon is the common name for the 28 species of fish belonging to the family **Acipenseridae.**
- Sturgeons are the **world's most endangered** fish.

- **Habitat** - Native to temperate waters of the Northern Hemisphere mainly Danube river.
- Most species live in the ocean while a few others are confined to fresh water.
- **Danube Sturgeons** – There were 6 sturgeon species formerly native to the Danube river.
- **IUCN Red List category**
 - **European sturgeon (Acipenser sturio)** - Locally extinct.
 - **The ship sturgeon (A. nudiventris)** - Locally extinct.
 - The remaining 4 sturgeon species in the Danube Basin are threatened.
 - **Stellate sturgeon (A. Stellatus)** - Critically Endangered.
 - **The Russian sturgeon (A. Gueldenstaedtii)** - Critically Endangered.
 - **Beluga (Huso huso)** - Critically Endangered.
 - **Sterlet (A. Ruthenus)** – Endangered.
- **CITES Regulation** - Since 1998, international trade in all species of sturgeons has been regulated under CITES.
- All sturgeons and parts or derivatives thereof (e.g. caviar, meat, skin, etc.) that enter international trade require the issuance of CITES permits or certificates.
- **Threats** - Poaching and trafficking .
- Heavily exploited globally for their roe/eggs (caviar) and meat.



8.10 Purandar figs

Agricultural and Processed Food Products Export Development Authority (APEDA) has recently facilitated the export of India's first ready-to-drink Purandar fig juice to Poland.

- Purandar figs are a variety of fig grown in the **Purandar taluk of Pune district**, Maharashtra.
 - Pune district is the top fig-producing area in Maharashtra.
- They are known for their sweet taste, size, and nutritional value, and are considered one of India's best figs.
- **First cultivation**- Figs were commercially cultivated in **1904** at Jadhavwadi in Dive village of Purandar tehsil.
- **Popularity**- This fig variety gained recognition in the 1920s.
- **GI tag**- Acquired in **2016**, providing legal protection and promoting exports.
- **Taste and texture**- Known for their unique sweet taste, Purandar figs have an attractive **violet color** due to the high calcium and potassium content of the region's red and black soil.
- **Shape and size**- Bell-shaped, larger than other varieties.
- **Pulp content**- Over 80% pulp, with a pinkish-red color, rich in vitamins and minerals.
- **Ripening seasons**- Figs ripen twice a year, from May to June and December to January.
- **Climate and soil**- Purandar figs are grown in areas with dry weather, hilly slopes, and well-drained medium land, and are cultivated using a **salt-free irrigation technique**.
- **Export milestones**
 - Exported to Germany in 2022.
 - Showcased at Macfrut 2024 in Rimini, Italy.
- **Patent**- The product was granted a provisional patent, marking significant agricultural innovation.



APEDA

About

Agricultural and Processed Food Products Export Development Authority

Establishment	1985
Governing Ministry	Ministry of Commerce and Industry
Key Functions	Promotion and development of the export of agricultural and processed food products from India
Headquarters	New Delhi
Geographical Indications (GI)	Involved in the promotion and registration of GI tags for Indian agricultural products
Product Coverage	Fruits, vegetables, meat, poultry, dairy products, alcoholic and non-alcoholic beverages, cereals, etc.

8.11 Malabar Tree Toad (MTT)

According to a recent study, Climate change may decrease the distribution range of the Malabar Tree Toad (MTT) by up to 68.7% of the current estimated distribution in India's protected areas (PAs).

- **MTT** – It is a small warty Asian Toad amphibian species **endemic to Western Ghats**.
- **Scientific name** - Pedostibes tuberculosus.
- **Physical Characteristics** - This is a slender frog with a moderate-sized head.
- The male has a subgular vocal sac while the females are larger ones.
- **Habitat** –It is the **only arboreal toad species** in India, having the unique capability to climb trees.
- It is found in wet tree hollows or leaf bases containing water.
- They are found along Western Ghats at elevations of 250 m to over 1000 m, often beside streams.
- **Discovery** - It was first discovered in 1876
- It was later rediscovered in 1980 at Silent Valley National Park in Kerala.
- **Conservation Status**
 - **IUCN** – Endangered.
 - **Wild of Protection Act ,1972**– Schedule II
 - **CITES** – Not listed.
- **Threat** – Habitat fragmentation, pollution, disease and orphological deformities.
- Climate change has led to the decline of amphibian populations in the past 40 years.
- Annual precipitation influences species populations and distribution.
- Drought situation experienced by toads and frogs of Karnataka in 2023 impacted their breeding and nesting habitats.

Toad is a common name for certain frogs, especially of the family Bufonidae, that are characterized by dry, leathery skin, short legs, and large bumps.

Habitats of Malabar Tree Toad	
Tamilnadu	<ul style="list-style-type: none"> • Kalakad Mundanthurai Tiger Reserve
Kerala	<ul style="list-style-type: none"> • Silent Valley National Park
Karnataka	<ul style="list-style-type: none"> • Sharavathi Valley Wildlife Sanctuary • Mookambika Wildlife Sanctuary • Brahmagiri Wildlife Sanctuary • Kudremukha National Park
Goa	<ul style="list-style-type: none"> • Netravali Wildlife Sanctuary • Mhadei Wildlife Sanctuary • Mollem National Park





8.12 Mettukurinji

The rare Mettukurinji flowers have blossomed over the hills of Idukki.

- Mettukurinji is a small purple flowering shrub.
- **Taxonomy**

- **Scientific name** - *Strobilanthes sessilis*
- **Family** – Acanthaceae
- **Nativity** – It endemic to Western Ghats.
- **Growing conditions** – Their delicate flowers are sensitive to rainfall, heat and synchronisation with the lifecycle of mutualists such as pollinators.
- **Blooming season** – It starts in August and ends in November.
- **Monocarpic** – They flower only once in their life time and then die.
 - Leaves of this species are toxic and unfit for human consumption.
- **Threat** – Climate change, frequent landslides, floods and unsustainable tourism.
- **Conservation** - Kurinjimala Sanctuary protects the core habitat of the plant in Kerala and the Eravikulam National Park in Kerala is known for widespread blooming of the kurinji plants.
- **Importance** – It is a flagship species of the montane ecosystem.
- They have anti-inflammatory properties and has a biologically significant flavouring agent ‘endo fenchyl acetate’.

	Neelakurinji	Mettukurinji (Topli karvy)
		
Botanical Name	<i>Strobilanthes kunthiana</i>	<i>Strobilanthes sessilis</i>
Blooming Cycle	14 years once	7 years once
Blooming Type	Individual Blooming	Mass blooming known as “Masting”
Location	shola grasslands of southern Western Ghats at an elevation of 1000 m	Steepest cliffs and plateaus of periphery of the northern side of the Western Ghats at 800 metres above sea level
Physical features	Presence of Leaf stalks	Absence of leaf stalks
Flower Arrangement	Flowers are attached distant from stem	Flowers are closely attached to the stem with long hairs between the leaf base and stem
IUCN Status	Vulnerable	Not listed
Wild life protection act,1972	Schedule III	Schedule III

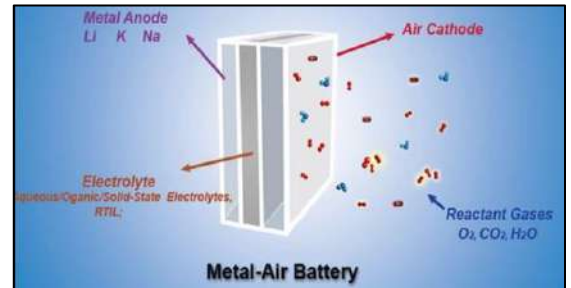
9. SCIENCE & TECHNOLOGY

PHYSICAL SCIENCE

9.1 Metal - Air Batteries

Scientist from CSIR-CMERI, Durgapur have synthesised a cathode material to be used as a catalyst in Metal Air batteries to enable them function in sub-zero climatic condition.

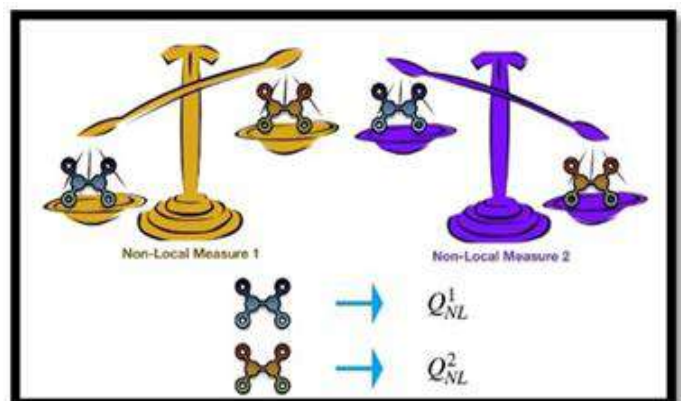
- **Metal Air Batteries** – They utilize atmospheric oxygen to generate electricity when in contact with metals like aluminum.
- It replaces the need for heavy cathode materials in Li-Ion batteries with metals such as Li, Na, K, Mg, Al, Zn, and Fe, utilizing O_2 at the air electrode.
- Metal–air batteries have higher energy density than lithium-ion batteries.
- Metals like aluminum are lightweight materials that produce energy equivalent or more than lithium-ion batteries.
- **The Catalyst** – It combines an efficient durable cathode catalyst and anti-freezing electrolyte fabricated for Zn-air batteries.
- It is formed by integrating CoFe alloy and Fe_3C nanoparticles using an in-situ growth technique.
- The CoFe/ Fe_3C alloy/carbide hybrid structure enhances the durability and shows catalytic performance as a cathode.
- These are multifunctional catalysts capable of accelerating the ORR (Oxygen Reduction Reaction), OER (Oxygen Evolution Reaction), and HER (Hydrogen Evolution Reaction) simultaneously.
- **Benefits**
 - Remarkable efficacy in both liquid and solid-state zinc-air batteries.
 - Ability to function even under sub-zero temperatures.
 - Potential for practical electrochemical applications.
 - Long-range, lightweight, and recyclable source of energy.



9.2 Quantum nonlocality

Recent research has revealed that it is impossible to create a universal standard for measuring non-local quantum correlations, a key finding in quantum mechanics.

- **Quantum Nonlocality**- It describes a connection between distant physical objects that does not allow for faster-than-light communication.
- It is often associated with entangled states, which violate **Bell inequalities**, a way to test whether nature agrees with Einstein's local realism or with the standard quantum mechanical interpretation.
- **Bell's Theorem**- It was introduced by physicist **John Stewart Bell in 1964**, it challenged the **concept of 'local realism' in classical physics**.
- Bell's theorem showed that quantum systems with multiple distant parts exhibit correlations that cannot be explained by local realism.
- This theorem was confirmed by experiments and earned the 2022 Physics Nobel Prize.
- **Application**- Quantum nonlocality has been significant in natural sciences and has applications in secure communication, random number generation, and cryptographic key creation.
- **Finding**- The study noted that the nature of nonlocality varies depending on the type of correlation, meaning there is **no single, universal resource in quantum nonlocality**.
- Each non-local resource is unique and capable of performing specific tasks that others cannot.
- **Implications**- The discovery expands the potential applications of quantum nonlocality and adds complexity to the understanding of quantum mechanics.



9.3 Sonoluminescence

Sonoluminescence recently seen in the news for research into its mysterious light emission and extreme temperatures, highlighting potential scientific applications.

- **Sonoluminescence-** It is the ***emission of light*** from imploding bubbles in a liquid when excited by sound waves.
- A small gas bubble in a liquid collapse rapidly under the influence of intense sound waves, producing a flash of light.
- The light emitted is ***usually a short flash***, and the duration of the flash depends on several factors, including
 - The sound-field frequency,
 - The sound pressure amplitude,
 - The size of the bubble,
 - The type of liquid, and
 - The gas inside the bubble.

- **Discovery and history-** Identified in **1934** at the University of Cologne by studying sonar technology.
- They noticed that powerful sound waves caused trapped gas bubbles in a liquid to emit light during rapid collapse.

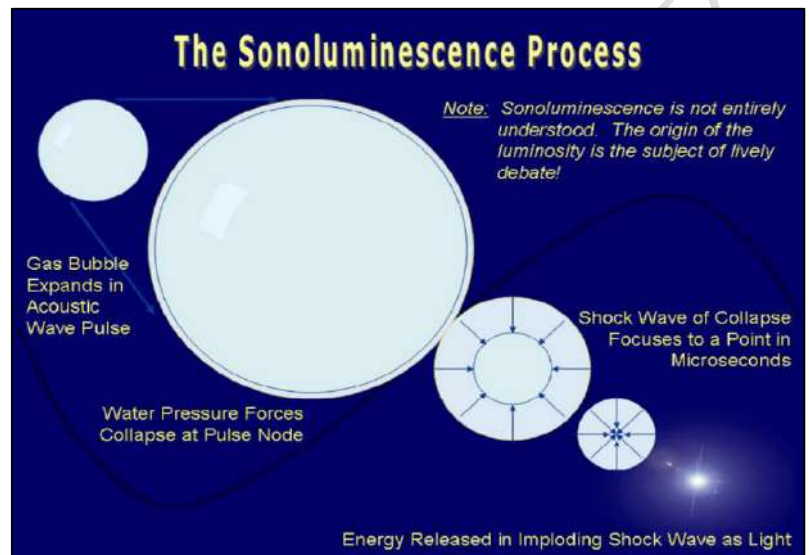
- **Types-**

- **Single-Bubble Sonoluminescence (SBSL)** - Involves a single gas bubble emitting light repeatedly when driven by a consistent acoustic field.
- **Multi-Bubble Sonoluminescence (MBSL)** - Occurs when numerous bubbles collapse simultaneously, producing a diffuse light emission.

- **Mechanism - Bubble dynamics-** Sound waves create alternating high and low-pressure phases, causing bubbles to expand and collapse rapidly.
- During collapse, bubbles undergo extreme compression leading to significant temperature rise.
- **Temperature and energy-** Temperatures inside collapsing bubbles can ***reach up to 11,700°C***.
- **Light emission-** The extreme conditions cause gases within the bubble to ionize, emitting light in about a ***trillionth of a second***.

Theories explaining Sonoluminescence

- **Hotspot theory-** Attributes light emission to extremely high temperatures achieved during bubble collapse.
- **Bremsstrahlung radiation-** Suggests that decelerating electrons emit radiation due to interactions within the hot plasma.
- **Argon rectification hypothesis-** Proposes that rectified diffusion of noble gases like argon contributes to light emission.
- **Pistol shrimp (Family Alpheidae)**
 - Possess a specialized claw that snaps shut rapidly, creating a high-speed jet of water.
 - The resulting low-pressure bubble collapses, producing a loud sound, intense heat, and a brief flash of light through sonoluminescence.
 - Notable as the first known instance of an animal utilizing sonoluminescence.
- **Potential application-** Some researchers have speculated that extreme conditions during sonoluminescence could facilitate ***thermonuclear fusion***.



SPACE

9.4 Kodaikanal Tower Tunnel Telescope

Scientists have discovered a new method to explore the Sun's secrets by studying magnetic fields at different layers of its atmosphere using data from the Kodaikanal Tower Tunnel Telescope.

Aspect	Details
Origins and Evolution	<ul style="list-style-type: none"> Established in 1899 as the Madras Observatory and later renamed as Kodaikanal Solar Observatory.
Location	<ul style="list-style-type: none"> Tamil Nadu
Operator	<ul style="list-style-type: none"> Indian Institute of Astrophysics (IIA)
Significance and Legacy	<ul style="list-style-type: none"> One of the oldest solar observatories globally. Maintains a 1250-year collection of solar observations. Plays a crucial role in tracking the Sun's activity over time. Known for the discovery of the <i>Evershed Effect in 1909</i>.
Primary Use	<ul style="list-style-type: none"> Observations and measurements of the Sun's magnetic fields Tracks the Sun's magnetic field and its evolution. Observes solar activity cycles, with the 25th cycle expected to peak in 2024-2025. Provides data on sunspots, solar flares, and coronal mass ejections (CMEs).
Environment	<ul style="list-style-type: none"> Situated at an altitude of 2,500 meters. Ideal for solar observations with over 220 days of clear skies. Low dust pollution and low atmospheric turbulence enhance observation quality.
Telescope Infrastructure	<ul style="list-style-type: none"> Houses 7 telescopes for solar observations. Key telescopes include Spectro Heliogram Telescope, Twin Telescope, Kodai Tower Tunnel Telescope, H-Alpha Telescope, and others. The 8-inch telescope is used for night sky observations.
Telescope Type	<ul style="list-style-type: none"> Coelostat-based telescope system with a 3-mirror setup.
Mirror Configuration	<ul style="list-style-type: none"> Primary Mirror (M1) - Tracks the Sun. Secondary Mirror (M2)-Redirects sunlight downwards. Tertiary Mirror (M3)- Makes the beam horizontal.
Focusing System	<ul style="list-style-type: none"> Achromatic doublet (38 cm aperture, f/96) focuses the Sun's image.
Image Scale	<ul style="list-style-type: none"> 5.5 arcsec per mm.
Key Spectral Lines Used	<ul style="list-style-type: none"> Hydrogen-alpha (Hα) line- 6562.8 Å Calcium II line- 8662 Å
Purpose of Spectral Lines	<ul style="list-style-type: none"> Inference of magnetic field stratification at different atmospheric heights.
Strategic and Geopolitical Importance	<ul style="list-style-type: none"> Studying solar eruptions critical to protect satellites, power grids, and communication networks. Helps predict and prepare for space weather events that could have global impacts.

9.5 Axiom-4 Mission

India has shortlisted 2 astronaut-designates for the upcoming Axiom-4 mission to the International Space Station.

- **Axiom-4-** It is a **private spaceflight** to the ISS operated by Axiom Space.
- **Launch-** October 2024.
- **Aim-** It aims to **promote commercial activities** in space, including scientific research, technological development, and space tourism.

- **Spacecraft-** The mission is supported by **SpaceX Crew Dragon spacecraft**. The flight is in collaboration with **NASA**.
- **Location-** It will take off from the Kennedy Space Center in Florida from a **Falcon 9 launcher**.
- **Duration-** The mission is said to last for **14 days**.
- **Crew Training-** Axiom Mission 4 crew members will train with NASA, international partners, and SpaceX.
- **Objectives**
 - **Commercial Space Endeavours** - It aims to facilitate commercial activities in space, including scientific research, technological development, and space tourism.
 - **International Collaboration** – It is set to carry a diverse crew of astronauts from different countries, reflecting the growing international interest in space exploration.
 - **Research and Development** -The mission will support various scientific experiments and technological tests in the unique microgravity environment of space.
- **Significance-** This collaboration between ISRO, Axiom Space, and NASA is a significant leap forward in international space cooperation.

9.6 AstroSat

Recently, researchers have discovered a vampire star in the M67 star cluster (Cancer constellation) that rejuvenates by siphoning material from a companion star using AstroSat.

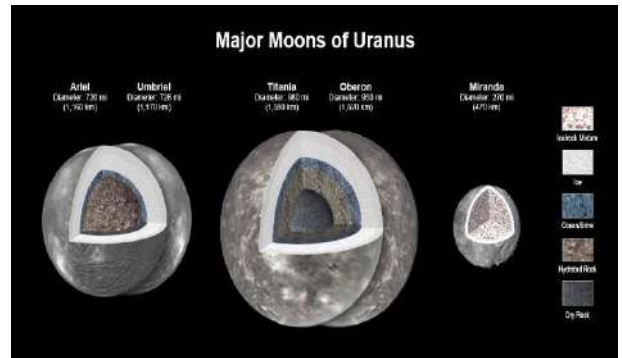
- It is India's **first dedicated multi-wavelength space observatory**, designed to study celestial sources across various spectral bands, including X-rays, optical, and ultraviolet light.
- It operates in a 650-km orbit with a 6° inclination, making it an important instrument in India's space research.
- **Launched in-** 2015, by PSLV-C30.
- **Mass-** 1515 kg.
- **Managed by** - The spacecraft control center at Mission Operations Complex (MOX) of ISRO Telemetry, Tracking and Command Network (ISTRAC), Bengaluru.
- **Objectives-** To observe astronomical objects in multiple wavelengths simultaneously, enhancing understanding of the universe.
- To investigate the emission processes, characteristics, and time variability of celestial sources.
- **Payloads**
 - **Ultraviolet Imaging Telescope (UVIT)-** Observes near-UV, far-UV, and visible regions.
 - **Large Area X-ray Proportional Counter (LAXPC)-** Observes in the hard X-ray band.
 - **Soft X-ray Telescope (SXT)-** Observes in the soft X-ray band.
 - **Cadmium Zinc Telluride Imager (CZTI)-** Observes in the hard X-ray band.
 - **Scanning Sky Monitor (SSM)-** Monitors the sky for transient X-ray sources.
- **Scientific focus-** ASTROSAT will operate as a proposal-driven general-purpose observatory, with a main scientific focus on
 - Simultaneous multi-wavelength monitoring of intensity variations in a broad range of cosmic sources.
 - Monitoring the X-ray sky for new transients.
 - Sky surveys in the hard X-ray and UV bands.
 - Broadband spectroscopic studies of X-ray binaries, AGN, SNRs, clusters of galaxies, and stellar coronae.
 - Studies of periodic and non-periodic variability of X-ray sources.

Vampire stars, more formally known as blue stragglers, are a fascinating and unusual type of star found in star clusters.

9.7 Underground Ocean on Ariel

The scientists using the James Webb Space Telescope have detected carbon dioxide ice on Uranus' moon Ariel, marking a key discovery in the search for water in the solar system.

- Scientists working on the “Moons of Uranus” project has been closely studying 4 specific moons orbiting Uranus in order to find traces of ammonia, organic molecules, water, or carbon dioxide ice.
 - They found that carbon dioxide ice was present on the surface of Uranus’ moon called Ariel.
 - **Potential Underground Ocean-** The presence of **carbon dioxide ice** on Ariel suggests there may be a **liquid ocean beneath its surface**.
 - **Possible Chemical Processes-** The underground ocean may be releasing carbon dioxide through chemical processes, which then escapes to the surface via ice cracks.
 - Another theory suggests that Uranus’ magnetic field could be **breaking down molecules to generate carbon dioxide**.
 - **Additional Findings-** Carbon monoxide and traces of carbonates were also found on Ariel’s surface. Carbonates are typically formed when water interacts with rocks.
 - **Significance-** Underground oceans are considered important in the **search for extra-terrestrial life**, as they may harbour or sustain life.



Ariel

- Ariel, second nearest of the five major moons of Uranus.
- **Size-** It has a diameter of about 1,158 kilometres.
- It is the fourth-largest of Uranus’ moons.
- **Discovery-** It was discovered in 1851 by William Lassell
- Other major discovery on Ariel was conducted by the Voyager 2 spacecraft in January, 1986.
- **Voyager 2-** The primary source of information about Ariel comes from the Voyager 2 flyby in 1986.
- The spacecraft provided detailed images and data about its surface and features.
- **Surface-** Ariel’s surface is characterized by a mix of bright, young surfaces and older, heavily cratered areas.
- **Internal Structure-** The moon is composed mainly of water ice and rocky material, with its internal structure possibly consisting of a silicate core surrounded by an icy mantle.
- **Magnetic Field-** Ariel does not have a significant magnetic field of its own.

9.8 JUICE probe

European scientists were due to attempt a first in orbital gymnastics tapping into the gravity of the earth.

- **JUICE probe-** The Jupiter Icy Moons Explorer (JUICE) probe.
- It is a **European Space Agency (ESA) mission** designed to explore Jupiter and its 3 large moons i.e. **Callisto, Europa, and Ganymede**.
- **Launched in -** April, 2023, aboard an Ariane 5 rocket from the Guiana Space Centre.
- **Goals**
 - **Exploring the moons -** Create detailed maps of the moons’ surfaces, analyze the water bodies beneath them, and characterize them as planetary objects and potential habitats
 - **Studying Jupiter -** Monitor Jupiter’s magnetic, radiation, and plasma environment, and understand its origin, history, and evolution
 - **Searching for life -** Investigate the possibility of life in space by studying the moons’ subsurface oceans, which are believed to have conditions that could support life.

9.9 Gravity assist

- It is a technique where a spacecraft brushes past a planet or moon, using its **gravity to alter speed or trajectory**.
- Scientists will tapping into the gravity of the earth to guide the JUICE probe towards Jupiter in the **first-ever double slingshot manoeuvre**.

- In a novel double manoeuvre, the JUICE probe will first use the gravity of the moon to swing towards the earth on exactly the right trajectory.
- If successful, it will put JUICE on course to reach Jupiter and its 3 large ocean-bearing moons - Callisto, Europa and Ganymede in 2031 with the help of three further single gravity assists
 - Venus in 2025, and then
 - The earth again in 2026 and 2029.

9.10 Mission Rhumi

Rhumi-1 recently takes off in Thiruvananthapuram in Chennai's East Coast Road.

- Rhumi-1 is India's **first reusable hybrid rocket** on a mobile Launchpad with the goal of advancing research on global warming and climate change.
- It is an initiative of **Space Zone India, Tamil Nadu-based start-up** in partnership with Martin Group.
- **Altitudes** - Ranging from 1 km to 500 km.
- **Weight** - 80 kilograms and 3.5 metres tall.
- It is powered by a hybrid motor using a generic fuel and features an electrically triggered parachute deployer.
- **Fuel** - Rhumi-1 rocket combines the advantages of both liquid oxidiser and solid fuel propellant systems.
- **Trajectories** - RHUMI 1 is equipped with adjustable launch angle that can be set anywhere between 0 and 120 degrees, enabling precise trajectory adjustments.
- **Payloads** - Rhumi-1 carried 3 cube satellites designed to monitor and gather data on atmospheric conditions, such as cosmic radiation intensity, UV radiation, and air quality.
- The rocket also deployed 50 different Pico satellites, each dedicated to studying various atmospheric factors, including accelerometer readings, altitude, and ozone levels.

9.11 Tanager-1

Tanager-1 satellite launched recently aboard a SpaceX Falcon 9 rocket from Vandenberg Space Force Base in California.

- **Tanagers 1** – It is a **hyperspectral satellite** launched by a coalition of companies and organisations, including NASA's Jet Propulsion Laboratory.
- **Features** – It can measure point-source emission, down to the level of individual facilities and equipment, around the world.
- It will scan 130,000 square kilometres of Earth's surface per day.
- **Technology** - The satellite will use **imaging spectrometer technology** developed at **Jet Propulsion Laboratory** to track methane and carbon dioxide emissions.
- It will measure hundreds of wavelengths of light that are reflected by Earth's surface.
- Different compounds in the planet's atmosphere including methane and carbon dioxide absorb different wavelengths of light.
- This leaves spectral "fingerprints" that the imaging spectrometer can identify.
- These infrared fingerprints can enable to pinpoint and quantify strong greenhouse gas emissions.
- **Use** - The satellite can detect major emitters of carbon dioxide and methane.
- Data from Tanager-1 can be used to identify gas plumes with the unique spectral signatures of methane and carbon dioxide and pinpoint their sources.

9.12 Human Exploration Rover Challenge (HERC)

Recently, a team of Indian students built a lunar rover for a competition in NASA.

- **HERC-** It is an **annual competition** for high school and college students to design, build, and race human-powered, collapsible vehicles over simulated lunar/Martian terrain.
- The challenge **encourages students worldwide** to engage in human space exploration through design, construction, and testing of technologies.
- **Establishment-** The NASA Human Exploration Rover Challenge (HERC) began in **1994**, originally known as the **Great Moonbuggy Race**.
- **Historical ties-** The challenge was conceived in the spirit of NASA's **Apollo missions** and the Apollo Lunar Roving Vehicle (LRV) used during Apollo 15.
- **Artemis mission connection-** HERC now serves as an **Artemis Student Challenge**, drawing inspiration from both Apollo and Artemis missions, which focus on returning humans to the Moon and advancing space exploration technologies.
- **Global participation-** While most participants are from the United States, teams from countries like Canada, Mexico, India, Germany, and Romania also compete.
- **Structure and divisions-**
 - **Human-Powered (HP) division-** Teams design and build a human-powered rover that must traverse challenging terrains, mimicking conditions astronauts faced on the Moon.
 - **Remote-Controlled (RC) division-** Introduced recently, this division focuses on solving complex scientific tasks using a remotely operated vehicle, expanding the challenge's reach and inclusivity.
- **Diverse participation-** Teams must include both male and female riders, a rule introduced in 2020 to promote diversity and inclusion.
- **31 years of challenge-** In 2024, HERC marks 31 years of challenging students in designing and racing rovers.

Methane

- Methane is an invisible strong greenhouse gas.
- It is the 2nd largest contributor to global warming after carbon dioxide, responsible for 30 per cent of global heating since the Industrial Revolution.
- Methane is 80 times more potent at warming than carbon dioxide.
- The gas also contributes to the formation of ground-level ozone — a colourless and highly irritating gas that forms just above the Earth's surface.
- Fossil fuel accounts for about 40% of all human-caused methane emissions.

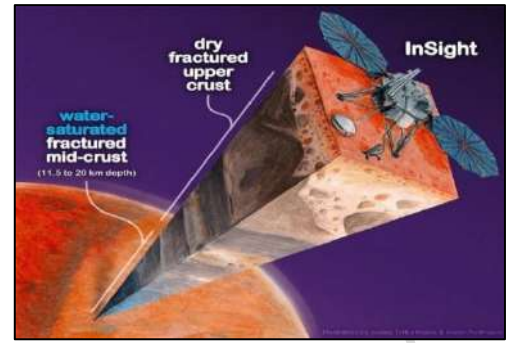
The Artemis mission aims to send the first woman and person of color to the Moon's South Pole, develop a sustained human presence on the Moon, and use in-situ resources to reduce dependency on Earth.

9.13 Huge reservoir of water under Mars

Seismic data from Mars reveals the presence of a vast underground reservoir of liquid water beneath the surface.

- **Seismic data from NASA's InSight lander-** Scientists discovered a large reservoir of liquid water deep under Mars' surface, based on seismic data from **NASA's InSight mission**.
- **Significance -** The discovery enhances the understanding of Mars' geological history, including its water cycle, crust composition, and mineralogy.
- **Water depth-** The water is estimated to reside 7.2 to 12.4 miles (11.5 to 20 km) below the surface, capable of filling an ocean covering Mars globally.
- **Microbial life-** Conditions at these depths may have been favorable for microbial life in the past or present.
- Similar findings on Earth, where microbial life exists underground, suggest the possibility of life in Martian aquifers.
- **Seismic wave analysis-** Seismic waves measured by InSight indicated that the rocks in Mars' mid-crust are fractured and filled with liquid water.
- The new study found that water is embedded in fractured **igneous rocks** formed by the cooling of magma.
- **Water on Mars-** The presence of water on Mars was confirmed **16 years ago**, but the existence of large underground reservoirs of water was hypothesized.
 - In 2008, NASA's Phoenix lander confirmed the presence of water ice on Mars, marking a pivotal discovery.
- Mars once had liquid water on its surface, in rivers, lakes, and possibly oceans, over 3 billion years ago.
- Much of this water may have seeped into the planet's crust rather than escaping into space.

- Over time, Mars' surface cooled, leaving the water in the form of ice or within its crust.
- **Inaccessibility of water-** Although large amounts of water exist in the mid-crust of Mars, it is embedded in small crevices and pores of rocks, located at depths between 11.5 to 20km below the surface.
- Drilling deep enough to access these water reservoirs is technically difficult.
- Accessing this water is extremely difficult due to Mars' low gravity and technical challenges in drilling at such depths.
- Tectonically active regions like ***Cerberus Fossae*** may offer alternative sites for accessing subsurface water.
- Additionally, protecting the Martian environment from contamination remains a major concern for future missions.



NASA's InSight Lander

- **InSight** - "Interior Exploration using Seismic Investigations, Geodesy and Heat Transport."
- **Launch-** 2018.
- **Objective-** NASA's InSight lander was launched to study the deep interior of Mars, focusing on its structure and geological processes.
- **Goal-** The primary goal was to explore Mars' interior, including its crust, mantle, and core, through seismic measurements, temperature readings, and radio science experiments.

9.14 Earth Observation Satellite- o8

The Indian Space Research Organisation (ISRO) successfully launched the Earth Observation Satellite (EOS) -o8 Earth Observation Satellite.

- **EOS-o8-** It is a satellite designed for ***Earth observation*** and carries advanced technology for various tasks such as disaster ***monitoring, environmental observation, and surveillance***.
- **Launch-** Using the ***Small Satellite Launch Vehicle (SSLV)-D3***.
 - The SSLV is a rocket designed for quick, flexible launches of small satellites (10-500 kg) with minimal infrastructure, can carry multiple satellites simultaneously.
- **Objective-** To demonstrate consistent flight performance of the SSLV vehicle systems.
- To successfully deploy the EOS-o8 satellite and SR-o DEMOSAT into a 475 km circular orbit.
- **Aim-** The mission focuses on designing and ***developing a microsatellite*** with advanced payload instruments and new technologies for future satellites.
- **Payloads-** A total of 3 Payloads

Payload	Features
Electro Optical Infrared Payload	The EOIR will capture images in the Mid-Wave IR (MIR) and Long-Wave IR (LWIR) bands, useful for satellite-based surveillance, disaster monitoring, environmental monitoring, and fire detection, among other applications.
Global Navigation Satellite System- Reflectometry	The GNSS-R payload will demonstrate remote sensing capabilities for ocean surface wind analysis, soil moisture assessment, flood detection, and studies of the Himalayan cryosphere
SiC UV Dosimeter	This payload will monitor UV radiation for the future manned-mission Gaganyaan and will act as a high-dose alarm sensor for gamma radiation.

- EOS-o8 demonstrates several novel satellite technologies, improving efficiency and reducing the assembly, integration, and testing phases, thereby advancing India's space capabilities.

9.15 Sapno ki Udaan

On India's National Space Day, the Ministry of Education and NCERT launched an e-magazine titled 'Sapno ki Udaan.'

- **Sapno ki Udaan-** It is the 1st edition of e-magazine which marks the 1st anniversary of Chandrayaan-3's successful landing on the lunar South Pole.
- **Nodal agency-** Department of School Education & Literacy, Ministry of Education.
- **Goal-** This initiative aligns with the #NEP2020 goals of making education accessible and equitable, preparing students for 21st-century global challenges.
- **Theme-** The magazine's 'space' theme reflects the boundless imagination of our children.

National Space Day

- **1st National space day-** The Indian government officially declared **August 23** as National Space Day marking the successful landing of **Chandrayaan-3's Vikram Lander** on the moon.
- **Theme-** The theme for India's first National Space Day is 'Touching Lives while Touching the Moon: India's Space Saga'.
- **Historic Achievement-** In 2023, India became the **fourth country** to land on the moon and the first to land near the southern polar region.
- Landing site of Chandrayaan-3 would be named 'Shiv Shakti Point.'
- **Technological Advancement-** The day celebrates India's progress in space research and exploration.
- **Inspiration for Youth-** It aims to inspire future generations to pursue careers in STEM (Science, Technology, Engineering, and Mathematics).

Future Space Missions and Plans

- **Chandrayaan 4 and 5-** India has announced that Chandrayaan 4 and 5 will follow the success of Chandrayaan-3.
- **Gaganyaan mission-** India plans to send its first astronaut into space in 2025.
- **Long-term goals-** By 2035, India aims to establish the **Bhartiya Antariksh Station** and plans an Indian landing on the moon by 2040.

DEFENCE

9.16 Maritime Partnership Exercise (MPX)

Recently, Indian Navy successfully conducted the Maritime Partnership Exercise (MPX) at Baltic Sea.

- **MPX** – A multilateral event conducted by Indian Navy in which naval forces of foreign countries participate.
- **Aim** – To enhance Indian Navy's operational capabilities and strengthen its partnerships with friendly nations.
- **Importance** – It enhances the ability of different naval forces to operate together seamlessly, which is crucial in times of crisis or conflict.
- It strengthens diplomatic and military ties between participating nations, fostering greater regional and global stability.
- It also allows participating navies to train and refine their tactics, techniques, and procedures, leading to improved operational effectiveness.
- **MPX 2024** – It is **between India and Russia**, which involved naval ships from both nations
 - **India-** INS Tabar, was built in Russia and was commissioned into the Indian Navy, on April 19, 2004.
 - **Russia-** Soobrazitelny
- **Activities** – It involved a series of complex naval manoeuvres, including
 - Communication drills
 - Search-and-rescue tactics
 - Replenishment at sea procedures

In 2023, Indian Naval ships INS Rana and INS Sumedha undertook a Maritime Partnership Exercise (MPX) with French Navy ship FS Surcouf, in the Bay of Bengal on 30 June 2023.

- **Significance** – The Indian Navy's participation in the 328th Russian Navy Day Parade and MPX highlights a key step in maritime cooperation for regional peace and security.

9.17 Bailey bridge

The Indian Army erected a Bailey bridge in Wayanad recently due to the heavy floods.

- **Bailey Bridge** - It is a **modular bridge**, mechanically-launched single-span for temporary purposes.
- It has been crucial in facilitating the movement of heavy machinery and ambulances.
- **Invented by** - Donald Coleman Bailey, an English civil engineer, during World War 2 (1939-45).
- **Construction** - Developed during the 2nd World War and its parts are pre-built to assemble quickly when needed.
- **Parts** - Consist of light steel panels linked through pins, which are big, screw-like objects. These help establish the guardrails of the bridge.
- Through the guardrails on either side, beams are placed to form the deck or path of the bridge.
- Beams are made to lock with guardrails, and the bridge is extended to cover the crossing.
- **Advantages** - No heavy installation equipment is needed. It has a weight-carrying capacity of 24 tonnes.
- It has an increased span than other such temporary bridges and less time for construction.
- Modular bridges have the potential to accelerate reconstruction after disasters by transitioning directly to permanent infrastructure.
- **Use** - Employed over various types of obstacles like canals and ditches, across river, movement of troops in military operation, and disaster rescue.
- A 46-meter **indigenously designed** and manufactured modular bridge was inducted into the **Indian Army** in February 2024.
- It was designed and developed by the *Defence Research and Development Organization (DRDO)* and produced by L&T as a DRDO-nominated production agency.

9.18 Tarang Shakti

The Indian Air Force (IAF) is set to conduct its largest international air exercise, 'Tarang Shakti,' with participation from 30 countries.

- **About**- It will be the **biggest air combat exercise** to be hosted by India.
- **Aim**- To foster interoperability and share best practices and to showcase the indigenous defence industry.
- It will involve the practicing of a variety of combat missions in a realistic environment, boost mutual trust and help explore avenues for interoperability and imbibe best practices from one another.
- **Focus**- The focus of the exercise will be to showcase the indigenous capabilities under Aatmanirbharta.
- **Location**- First phase of the exercise will be held in **Tamil Nadu's Sulur** and the second phase will be in **Jodhpur**.
- **Participants**- Germany, France, Spain, UK to participate in 1st phase of exercise.
- US, Australia, Greece, Singapore, UAE to take part in 2nd phase.
- Russia not taking part due to ongoing war with Ukraine.
- **Participation from India**- IAF fighters participating in the drills include Rafales, Sukhoi-30 MKIs, Mirage 2000s, Jaguars, and MiG-29s.
- Locally produced assets include the Tejas LCA Mk-1, Prachand light combat helicopter, Dhruv advanced light helicopter, and its armed version, Rudra.

9.19 Security alert system based on Piezo-electric polymer nanocomposite

Recently, the researchers from Centre for Nano and Soft Matter Sciences (CeNS) and National Chemical Laboratory (CSIR-NCL) have developed a security alert system based on piezoelectric polymer nanocomposite.

- **Piezoelectricity** – It is a property of certain materials that induces an electric current when mechanically stressed.
- These materials can **convert mechanical energy into electrical energy** and vice versa.
- **Piezoelectric polymer nanocomposite material** – It is a type of composite material that combines a piezoelectric polymer with nanoparticles or nanomaterials to enhance its piezoelectric properties.
- **Polymer nanocomposites** – These are materials composed of polymer matrices and small amounts of nanometer-sized additives.
- Producing polymer nanocomposites improves the properties of polymers, including mechanical, thermal, and electrical.
- **Recent Findings** – It lies in the use of metal oxide nanomaterials as fillers, which enhance the piezoelectric response of the polymer composite.
- The research involved synthesizing zirconia-based metal-organic frameworks (UiO-66 and UiO-67), converted to zirconia nanoparticles.
- The nanoparticles were integrated into poly (vinylidene difluoride) (PVDF) to create nanocomposite films.
- Polymer nanocomposite with monoclinic zirconia nanoparticles produced from UiO-66 outperformed other derivatives and had greater piezoelectric output performance than pure polymer.
- **Application in security alert systems-** A laboratory-scale security alert system was demonstrated using the piezoelectric nanocomposite.
- The system employed a Bluetooth-based wireless communication module activated by footsteps on the piezoelectric pavement.
- The prototype demonstrated both security alert functionality and energy generation capabilities.

Zirconia is the most durable monolithic ceramic, which is a ceramic made without added materials.

HEALTH

9.20 National Sickle Cell Anaemia Elimination Mission (NSCAEM)

A total of 3.85 crore people have been screened in 17 identified States for sickle cell anaemia as of July 31.

- **Launch in** – 2023, in Madhya Pradesh.

Sickle Cell Disease

Sickle cell disease – A genetic blood disease affecting red blood cells.

Transmitted by – Parents carrying a defective 'beta globin' gene.

Spread – It is more common in the tribal population of India.

Symptoms – The disease starts early in life causing anemia, pain crises, reduced growth, low energy.

It affects many organs like lungs, heart, kidney, eyes, bones and the brain.

- **Mission** - To improve care of all Sickle Cell Disease patients
- To lower the prevalence of the disease through multi-faced coordinated approach towards screening and awareness strategies.
- **Vision** – To eliminate sickle cell disease as a public health problem in India before 2047.
- **Objectives** – To reduce the prevalence of SCD and to provide affordable, accessible and quality care for SCD patients.
- **Target** – To cover 7 crore people in three and half years 17

Gujarat, Maharashtra, Rajasthan, Madhya Pradesh, Jharkhand, Chhattisgarh, West Bengal, Odisha, Tamil Nadu, Telangana, Andhra Pradesh, Karnataka, Bihar and Uttarakhand are the high prevalent Sickle Cell Disease states.

- **Implementation** – Initially *focus is on high prevalence and tribal states/UT* and then to cover the *entire population from zero to 18 years of age* and incrementally covering population up to 40 years.
- **Implementation strategies** – It emphasizes on *3 pillars*.
 - **Health promotion**- Awareness generation & pre-marital genetic counselling
 - **Prevention** - Universal screening and early detection
 - **Holistic management & continuum of care** - Management of persons with sickle cell disease at primary, secondary and tertiary health care levels.
 - Treatment facilities at tertiary health care facilities.
 - Patient support system and Community adoption
- **Integrated approach** - Counselling through collaborative efforts of Central ministries and State governments.
- **Diagnosis** - ICMR-National Institute of Research In Tribal Health (NIRTH), Jabalpur provides training on diagnosis of SCD in States.
- **Treatment** - *Hydroxyurea treats SCD* by helping to prevent formation of sickle-shaped red blood cells.
- **Gene Therapy** - CSIR-Institute of Genomics and Integrative Biology (IGIB), Delhi has been working in gene editing therapies for advanced treatment options for SCD.

Hydroxyurea has been included in the National Health Mission (NHM) Essential Drugs List at Sub-Health Centres thus making it available at Primary Health Centres (PHC) and Urban PHC, Community Health Centres (CHC) and District Hospitals.

9.21 Osmolyte

Recent research reveals that small molecules known as osmolytes help proteins stay stable and functional under stress.

- **Osmolytes**- These are *small molecules that stabilize proteins* and prevent them from misfolding and ensuring proper function.
- They help cells survive stress and maintain protein stability.
- This makes them potential targets for drug development.
- **Technique Used**- *Covalent magnetic tweezers* to observe protein folding and interaction with osmolytes.
- **Types of osmolytes**
 - **Compatible Osmolytes**- They help stabilize proteins without disrupting their normal function.
 - Examples include urea and glycerol.
 - **Counteracting Osmolytes**- These molecules protect proteins by counteracting the effects of denaturing conditions.
 - Examples - Trimethylamine N-oxide (TMAO) and certain types of amino acids.
- **Findings** - Different osmolytes have varied effects on proteins.
 - **TMAO** -At high concentrations (1.5M), it significantly increases the strength of Protein L, enhancing its resistance to unfolding.
 - Low concentrations have minimal effect on protein unfolding.
 - High levels of TMAO are associated with heart diseases.
 - **Trehalose** - Stabilizes the unfolded state of Protein L.
- **Implications** - Insights into osmolyte-protein interactions can guide the *development of new drugs* for neurodegenerative diseases and conditions related to protein misfolding.
- This finding could advance treatments for diseases like *Alzheimer's and Parkinson's*.

9.22 Global Traditional Medicine Centre (GTMC)

The Ministry of Ayush and the World Health Organization signed a Donor Agreement that outlines the financial terms for implementing the activities of the WHO Global Traditional Medicine Centre.

- It is a knowledge centre for traditional medicine.

- **Established by - World Health Organization (WHO)**, at Jamnagar, Gujarat.
- **Aim** – To focus on evidence and learning, data and analytics, sustainability and equity, and innovation and technology to optimize the contribution of traditional medicine to global health and sustainable development.
- **Guiding principle** – *Respect for local heritages*, resources and rights.
- **Activities** – Develop tools and methodologies for data collection, analytics, and impact assessment.
- Create a collaborative network with existing traditional medicine data banks, virtual libraries, and research institutions.
- Offer training programs in traditional medicine in collaboration with the WHO Academy and other partners.
- **Strategic Importance** – **Around 80%** of the world's population and 170 WHO member states report the use of traditional medicine.
- Natural products account for around 40% of all pharmaceutical products.
- It has potential to *become a trillion-dollar industries* considering the demand for herbal medicines, beauty products and wellness centres.
- **Significance for India** – It enhances the recognition and integration of AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homeopathy) systems on the global stage.

WHO Global Traditional Medicine Centre (GTMC) first and only global out-posted Centre (office) for traditional medicine across the

9.23 DengiAll

Indian Council of Medical Research (ICMR) and Panacea Biotec have launched India's first-ever phase 3 clinical trial for a dengue vaccine.

- It is a **tetravalent recombinant live attenuated vaccine** which works against all 4 serotypes of dengue.
- **Indigenously developed by** - Panacea Biotec.
- It is based on the tetravalent dengue vaccine strain (TV003/TV005), originally developed by the National Institutes of Health (NIH), U.S.

Dengue

- **Dengue**- It is a **viral infection**, and there are 4 serotypes of the dengue virus - **DEN-1, DEN-2, DEN-3 and DEN-4**.
- **Spread** – Dengue is found in **tropical and sub-tropical climates** worldwide, mostly in urban and semi-urban areas.
- **Vector borne disease** – It is spread through the mosquito vector and is the world's fastest-growing vector borne disease.
- **Transmission** – It is transmitted to humans by the Aedes mosquito species, which also spreads Chikungunya and Zika virus.
- It is primarily caused by the Aedes aegypti mosquito while other species within the Aedes genus are normally secondary to Aedes aegypti.
- **Symptoms** – Mostly asymptomatic, but the most common symptoms are high fever, headache, body aches, nausea and rash.
- **Diagnosis** – IgM, IgG antibodies test and NS1 antigen test.
- Both are done through ELISA kits and hence are popularly known as Elisa test.
- **Treatment** – No specific treatment but generally treated with pain medicine.
- **Prevention** – It depends on vector control.

Global dengue incidence is increasing, with over 129 countries affected as of 2023 (WHO data) and India ranks among the top 30 countries with the highest dengue incidence.

As of July 2, 2024, USA has 24 such agreements in force that govern peaceful nuclear cooperation with 48 countries.

- **Disease severity**- Higher risk of hospitalization and mortality in children, severe conditions like dengue hemorrhagic fever can occur.
- **Vaccination** - No current antiviral treatment is in India.
- Dengvaxia was the first vaccine to receive a nod in 2015 and has been licensed in 20 countries since. It is a live attenuated vaccine.
- WHO recommends 'Dengvaxia' for children aged 9 to 16 years.

9.24 New Sensor for Parkinson's disease

Recently, the scientists have developed a portable smartphone-based fluorescence turn-on sensor system that can assist in managing Parkinson's disease.

- It is a **brain condition** that causes problems with movement, mental health, sleep, pain & other health issues.
- It is characterized by a continuous decrease in neuron cells, leading to reduced dopamine levels.
- **Symptoms**- Includes tremors, slowed movement (bradykinesia), painful muscle contractions, impaired posture and balance, loss of automatic movements and difficulty in speaking.
- Many people with PD also develop **dementia**.
- **Vulnerables** - It usually occurs in older people, but younger people can also be affected.
- Men are affected more often than women.
- **Causes** - The cause of PD is unknown but people with a family history of the disease have a higher risk. Exposure to air pollution, pesticides and solvents may increase risk.
- **Treatment** - There is **no cure**, but therapies like Deep brain stimulation and medicines can reduce symptoms.
- **Medication** - Levodopa/carbidopa, a combination medicine that increases the amount of dopamine in the brain, is the most common medication.

Deep brain stimulation is a treatment that involves an implanted device that delivers an electrical current directly to areas of your brain which can improve how well those parts work.

9.25 Fluorescence turn-on sensor system

- **L-dopa detection sensor**- It is a portable, user-friendly sensor system to assist in managing Parkinson's disease by detecting the **concentration of L-dopa in the body**.
- **L-3,4-Dihydroxyphenylalanine (L-DOPA)**, a precursor to dopamine, compensates for this deficiency and is critical in the treatment of Parkinson's disease.
- L-DOPA, traditionally seen as an **inert amino acid** effective against Parkinson's disease through conversion to dopamine, is now proposed to be a neurotransmitter itself.
- **Need for precise dosage**- Proper L-dopa levels are crucial, as too much can cause serious side effects (e.g., dyskinesia, psychosis), while too little can lead to the return of Parkinson's symptoms.
- The sensor system helps in determining the precise L-dopa dosage required, making the disease manageable.
- **Features of the sensor system**
 - It is developed by the **Institute of Advanced Study in Science and Technology (IASST)**, an autonomous institute under the Department of Science and Technology.
 - It utilizes a fluorescence turn-on mechanism to instantly detect low levels of L-dopa in biological samples such as blood plasma, sweat, and urine.
 - The sensor is made by coating a silk-fibroin protein nano-layer onto reduced graphene oxide nanoparticles, forming quantum dots with strong photoluminescence properties.
 - Visual color changes in the sensor during detection are captured by a smartphone camera, and L-dopa concentration is evaluated using a mobile app.

9.26 Ancient Glacier Viruses in Tibet

A team of American and Chinese scientists has discovered as many as 1,705 genomes of viruses beneath the ice sheets in Tibet's Gulya Glacier.

- **Glacier-preserved ancient viruses** - Glacier ice is an important reservoir for bacteria and viruses.
- Some of these microorganisms were trapped in the ice for hundreds or thousands of years and are now being released into the environment as a result of ongoing climate change.
- **Novel Virus** - Many of these viruses are novel that their existence hasn't been recorded in science so far.
- **Stability** - These viruses haven't disintegrated biochemically even after major shifts in Earth's climate over millennia.
- **Glaciers Climate** - Glaciers, formed from the gradual accumulation of snow, can be continuous records representing past environments and recognized as a time capsule of our planetary evolution.
- They archive time-structured information on climates and ecosystems.
- **Gulya Glacier** - It is located above 20,000 feet in the northwestern Tibetan Plateau and has historically been an active site for paleoclimate research.
- **Evolution of Earth Climate** - Discovery of unrecorded viruses can shed light on evolution of Earth's climate over millennia.
- **Colder/Warmer era Viruses** - Viruses differed significantly between colder and warmer eras.
- A distinct community of viruses formed during these climatic shifts, at the end of the last ice age some 11,500 years ago.
- **Virus & Climate Change** - This indicates the potential connection between viruses and climate change.
- **Potential health threat** - Long-dormant viruses mostly infected other microbes rather than animals.
- Hence, excavating prehistoric ice sheets usually don't pose hazards for present-day human populations.
- Adaptations of these viruses could have compromised their hosts' ability to survive harsh weather conditions.

9.27 Monkeypox

Recently, World Health Organization (WHO) declared the Monkeypox or mpox outbreak a public health emergency of international concern amid an outbreak in Congo.

- **Money pox**- It is an **infectious disease** caused by the monkeypox virus.
- **Virus**- It is caused by the **Orthopoxvirus** genus in the **Poxviridae** family, which includes variola, cowpox, vaccinia, and other viruses.
- **Discovery**- It was first discovered in research monkeys in **Denmark in 1958**.
- The first human case was reported in a 9-month-old boy in the Democratic Republic of the Congo in 1970.
- **Transmission**- Mpox spreads **through direct contact** with infectious skin, lesions in the mouth or genitals, and contaminated objects like clothing or linens.
- It can also be transmitted in community settings like tattoo parlors.
- **Symptoms**- Appear 1 to 21 days after exposure and include rashes, fever, sore throat, headache, muscle aches, back pain, low energy, and swollen lymph nodes.
- **Diagnosis**- It can be diagnosed using **polymerase chain reaction (PCR) tests**.
- **Treatment**- There is **no specific treatment** approved for mpox.
- Healthcare professionals may treat mpox with some antiviral drugs used to treat smallpox, such as tecovirimat (TPOXX) or brincidofovir (Tembexa).
- **Global Mpox Crisis**-The Africa Centers for Disease Control and Prevention (Africa CDC) has declared the ongoing mpox outbreak in Africa as a public health emergency.
- The World Health Organization (WHO) reported that **Sweden is the first country outside of Africa** to detect the more lethal mpox strain, **clade I**.
- The mpox outbreak involves different strains (clades) of the virus.

- Clade I, a more deadly variant, is circulating primarily in the Democratic Republic of the Congo (DRC) and neighboring countries.
- Clade II, the strain from the 2022 outbreak, has been detected in the US but without signs of the more dangerous clade I.
- More than 27,000 cases and around 1100 deaths have been recorded since January 2023 as the African nation battles its worst-ever outbreak.

9.28 Spaceflight Associated Neuro-ocular Syndrome (SANS)

Recently, Sunita Williams underwent an eye test while being stranded in space, highlighting the importance of monitoring eye health in such extreme conditions.



Aspect	Details
SANS	<ul style="list-style-type: none"> ● It is a condition observed in astronauts characterized by changes in vision and ocular structures during/after spaceflight.
Impact of microgravity	<ul style="list-style-type: none"> ● Prolonged exposure to microgravity affects various body functions, with vision being particularly vulnerable due to fluid shifts.
Cephalad fluid shift	<ul style="list-style-type: none"> ● In microgravity, body fluids shift upwards (towards the head) due to the absence of gravity, leading to increased intracranial pressure and effects on the eyes.
Ocular changes observed	<ul style="list-style-type: none"> ● Optic Disc Edema- Swelling of the optic nerve ● Globe Flattening- Flattening of the eyeball ● Choroidal Folds- Wrinkles in the choroid layer ● Cotton Wool Spots- White patches on the retina ● Hyperopic Shift- Shift towards farsightedness.
Factors contributing to SANS	<ul style="list-style-type: none"> ● Increased Intracranial Pressure- Fluid shift increases pressure inside the skull, affecting the optic nerve. ● Altered Fluid Dynamics- Changes in fluid distribution in the eye impact its shape and structure. ● Vascular Changes- Reduced blood flow to the eyes, potentially causing ischemia.
Long-term vision effects	<ul style="list-style-type: none"> ● Vision typically improves post-flight, but some astronauts may experience lasting issues such as blurred vision or difficulty focusing. ● Potential increased risk of glaucoma or cataracts.
First identified	<ul style="list-style-type: none"> ● SANS was first recognized in astronauts returning from the International Space Station (ISS) in the early 2000s.

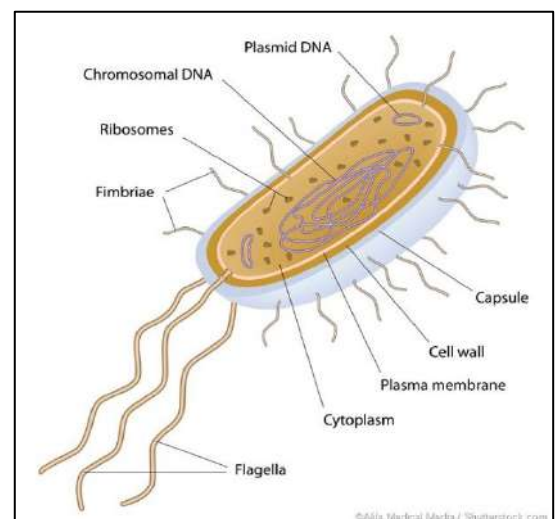
Primary symptoms	<ul style="list-style-type: none"> • Vision impairment (blurriness, difficulty in focusing) • Flattening of the eyeball (globe) • Swelling of the optic nerve (optic disc edema)
Affected individuals	<ul style="list-style-type: none"> • Primarily affects astronauts on long-duration space missions (e.g., those on the ISS for more than 6 months).
Mitigation strategies	<ul style="list-style-type: none"> • Research on artificial gravity through rotating spacecraft or centrifuges. • Countermeasures like lower body negative pressure devices and exercise regimens to mimic gravity effects. • Regular comprehensive eye exams before, during, and after spaceflight.
Diagnosis	<ul style="list-style-type: none"> • Pre- and post-flight eye exams • MRI scans • Optical coherence tomography (OCT)

BIO-TECHNOLOGY

9.29 Prokaryotes

Scientists recently found that prokaryotes are remarkably resilient to climate change and as a result, could increasingly dominate marine environments.

- A prokaryote is a **single-cell organism** whose cell lacks a nucleus and other membrane-bound organelles where Eukaryotic cells have membrane-bound organelles, such as a nucleus and mitochondria.
- Prokaryotes include both **bacteria and archaea**, another type of single-celled organism.
- **Structure** - Most prokaryotes are small, single-celled organisms that have a relatively simple structure.
- These organisms are thought to be the oldest cell-based lifeforms on Earth.
- **Organelles** - Prokaryotic cells are surrounded by a plasma membrane, but they have no internal membrane-bound organelles within their cytoplasm.
- **Size** - Prokaryotic cells are typically 0.1–5.0 micrometers (μm) in diameter, which is much smaller than eukaryotic cells, which can range from 10–100 μm .
- **Adaptability** - They thrive across the entire planet on land and in water, from the tropics to the poles.
- **Significance** - They play a crucial role in the world's food chains, helping support the nutrient needs of fish humans catch and eat.
- **Carbon emission** - Marine prokaryotes grow extremely fast a process that emits a lot of carbon.
- In fact, prokaryotes to an ocean depth of 200 metres produce about 20 billion tonnes of carbon a year double that of humans.
- This massive carbon output is balanced by phytoplankton another type of microscopic organism which turns sunlight and carbon dioxide into energy, through photosynthesis.
- **Recent findings** – Prokaryotes play an important role in keeping the oceans in balance. But the research shows this balance is at risk.
- It is found that prokaryotes are remarkably resilient to climate change and as a result, could increasingly dominate marine environments.



- This could reduce the availability of fish humans rely on for food, and hamper the ocean's ability to absorb carbon emissions.

9.30 BioE3 Policy

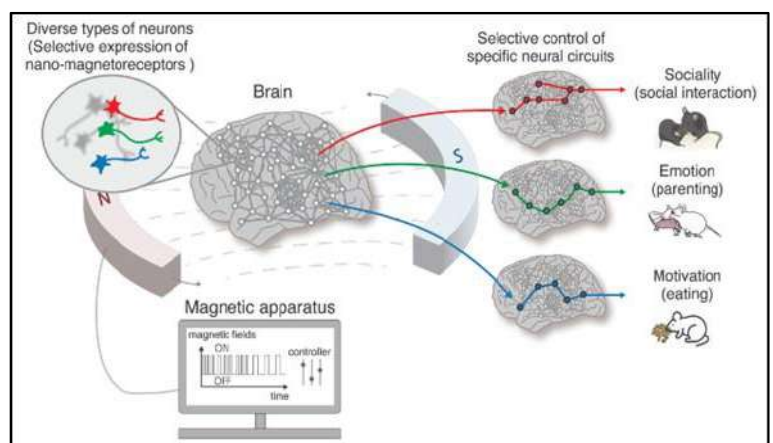
Cabinet recently approves BioE3 (Biotechnology for Economy, Environment and Employment) Policy.

- **Aim** - The policy aims for fostering High Performance Biomanufacturing.
- **High performance biomanufacturing** – It is the ability to
 - Produce products from medicine to materials,
 - Address farming and food challenges, and
 - Promote manufacturing of bio-based products through integration of advanced biotechnological processes.
- **Ministry** - Ministry of Science & Technology.
- **Focusing sectors** - The Policy would broadly focus on the following strategic/thematic sectors
 - High value bio-based chemicals,
 - Biopolymers & enzymes
 - Smart proteins & functional foods
 - Precision biotherapeutics
 - Climate resilient agriculture
 - Carbon capture & its utilization
 - Marine and space research.
- **Features** – It supports innovation-driven support to R&D and entrepreneurship across thematic sectors.
- This will accelerate technology development and commercialization by establishing Biomanufacturing & Bio-AI hubs and Biofoundry.
- Along with prioritizing regenerative bioeconomy models of green growth, this policy will facilitate expansion of India's skilled workforce and provide a surge in job creation.
- Overall, this Policy will further strengthen 'Net Zero' carbon economy & 'Lifestyle for Environment' and will steer India on the path of accelerated 'Green Growth' by promoting 'Circular Bioeconomy'.
- The BioE3 Policy will foster and advance future that is more sustainable, innovative, and responsive to global challenges and lays down the Bio-vision for Viksit Bharat

9.31 Nano-MIND technology

In the world's first experiment, researchers have developed Nano Magnetogenetic Interface for NeuroDynamics (Nano-MIND), a magnetogenetics technology successfully tested on mice.

- Nano-MIND technology, or Nano-Magnetic Information Network Device technology, is an emerging field in nanotechnology and information systems.
- It involves using nanoscale magnetic materials and devices to store, process, and transmit information.
- It enables precise, remote control of deep brain circuits.
- It uses **magnetic fields and nanoparticles** to modulate brain functions like cognition and emotion wirelessly.
- This technology advances brain manipulation by offering selective activation of neural circuits.



- **Finding of experiment**
 - Researchers activated specific neurons in various brain regions of mice to showcase the technology's capabilities.
 - They notably activated inhibitory Gamma-aminobutyric acid (GABA) receptors in the medial preoptic area (MPOA), linked to maternal behaviors.
 - Stimulating these neurons in non-maternal female mice led to increased nurturing behaviors, resembling maternal mice.
 - Feeding behaviors were also regulated by targeting motivation circuits in the lateral hypothalamus.
- **Applications-** Ultra-fast memory and storage systems, advanced computational devices, and improved data transfer technologies.

9.32 Microbial Biosurfactants

Recent research has analyzed the potential of biosurfactants in the food industry.

- **Biosurfactants-** These are **surface-active substances** produced by microorganisms.
- This serves as a **healthier substitute for synthetic surfactants** in the food industry.
- They are produced using **green substrates** from agro-industrial waste.

Surface active agents (SAAs) are molecules with the capacity to adsorb to solid surfaces and/or fluid interfaces, a property that allows them to act as multifunctional ingredients.

Types of Biosurfactants

Glycolipids	Include rhamnolipids, sophorolipids, and trehalolipids, commonly used for their emulsifying properties.
Lipopeptides	Such as surfactin and iturin, known for their strong surface activity and antimicrobial properties.
Phospholipids and Fatty Acids	Derived from microbial sources, useful in food and cosmetic industries.
Polymeric Biosurfactants	Including emulsan and liposan, these are effective in stabilizing emulsions

- **Finding of the study-** The study on biosurfactants in the food industry highlights the need for more research on their **toxicity, dose effects, and interactions** with other food components to secure regulatory approvals.
- The Cost-effective biosurfactants derived from agro-industrial waste offer a sustainable and healthier alternative to synthetic surfactants in the food industry.
- **Technological Advancements-** The study explores the use of genetic engineering, recombinant DNA technologies, and nanotechnology to enhance biosurfactant production.
- It also calls for collaboration between researchers and industrialists to improve production techniques and expand the market for biosurfactants.
- They help emulsify fats, improve shelf life, act as dispersing agents, and retain moisture, used to remove heavy metals from vegetables, boost immunity in fish, and serve as natural antioxidants.
- **Health and Environmental Benefits-** Unlike synthetic surfactants, biosurfactants are **eco-friendly, non-toxic**, and safe for human consumption.
- They do not cause adverse effects like imbalances in the gut microbiome or intestinal disorders.

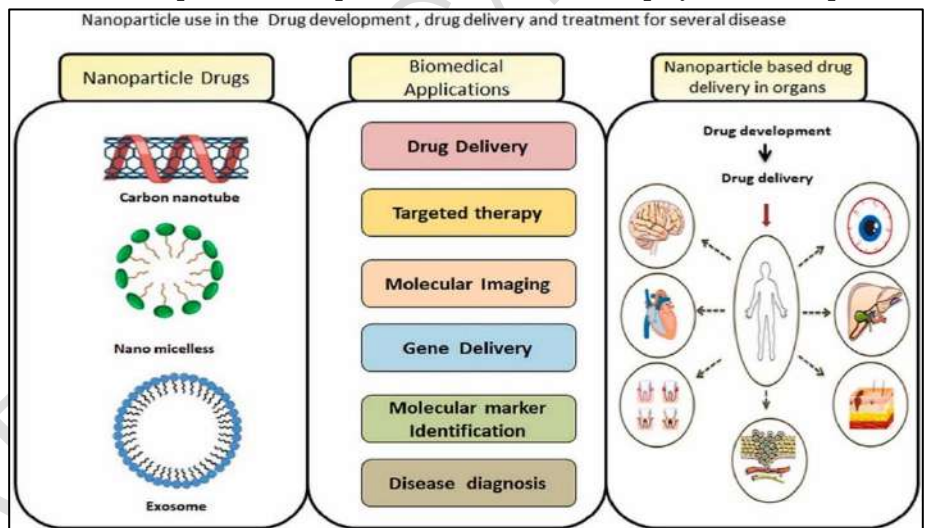
9.33 Drug Delivery Method Using Polymeric Nanoparticles

Recently, scientists at Agharkar Research Institute (ARI) under the Department of Science & Technology (DST) have developed a nanoparticle-based drug delivery system.

- It is a unique method developed of drug delivery using **Nikkomycin-loaded polymeric** nanoparticles.
- **Nikkomycins**- Nikkomycins are nucleoside amide antibiotics produced by **Streptomyces tendae Tü 901** and are known to show antifungal, anti-insecticidal, and acaricidal activities.
- They work by interfering with the building of the fungal cell wall which results in the fungal cell breaking open.
- The specific agent nikkomycin Z has weak activity against **Aspergillus fumigatus** which may be of benefit when used with other medications.
- The drug-loaded nanoparticles were effective in disrupting the growth of **Aspergillus species**.
- **Streptomyces**- It is the largest genus of actinobacteria comprising high GC (guanine and cytosine) content in their genomic DNA.
- They are Gram-positive saprophyte and abundant in soil, water (fresh and sea), and air.
- One can also find this group of bacteria in association with plants and animals.
- ARI have used a chitin synthesis fungicide, Nikkomycin, produced by the bacterial Streptomyces spp. to develop Nikkomycin loaded polymeric nanoparticles.
- **Polymeric Nanoparticles**- It refers to solid particles composed of macromolecular polymers, with particle size ranging from 10 to 1000 nm.

Aspergillus fumigatus is a species of fungus in the genus Aspergillus and is one of the most common Aspergillus species to cause disease in individuals with immunodeficiency.

- It can protect the encapsulated macromolecules from enzymatic degradation and change the dynamic behavior and tissue distribution of the encapsulated drugs in vivo.
- **Chitin** - Chitin is the most abundant aminopolysaccharide polymer occurring in nature and is the building material that gives strength to the exoskeletons of crustaceans, insects, and the cell walls of fungi.



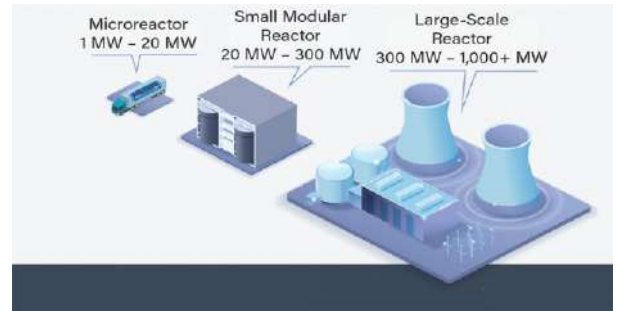
- Chitin is absent in the human body, making this a targeted approach.
- The nanoformulation developed was found to be free of cytotoxic and hemolytic effects.
- The ARI team is hopeful about the method's application in development of inhalation nanoformulations against pulmonary aspergillosis.
- **Benefits** - It may benefit patients with asthma, cystic fibrosis, HIV, cancer, lung diseases, and those on long-term corticosteroid medications.
- Nanoparticles enable controlled and effective drug release, with polymeric nanoparticles being the most advanced delivery method.
- **Safety and potential applications**- The Nano formulation was free of cytotoxic and hemolytic effects, indicating safety for use.

NUCLEAR TECHNOLOGY

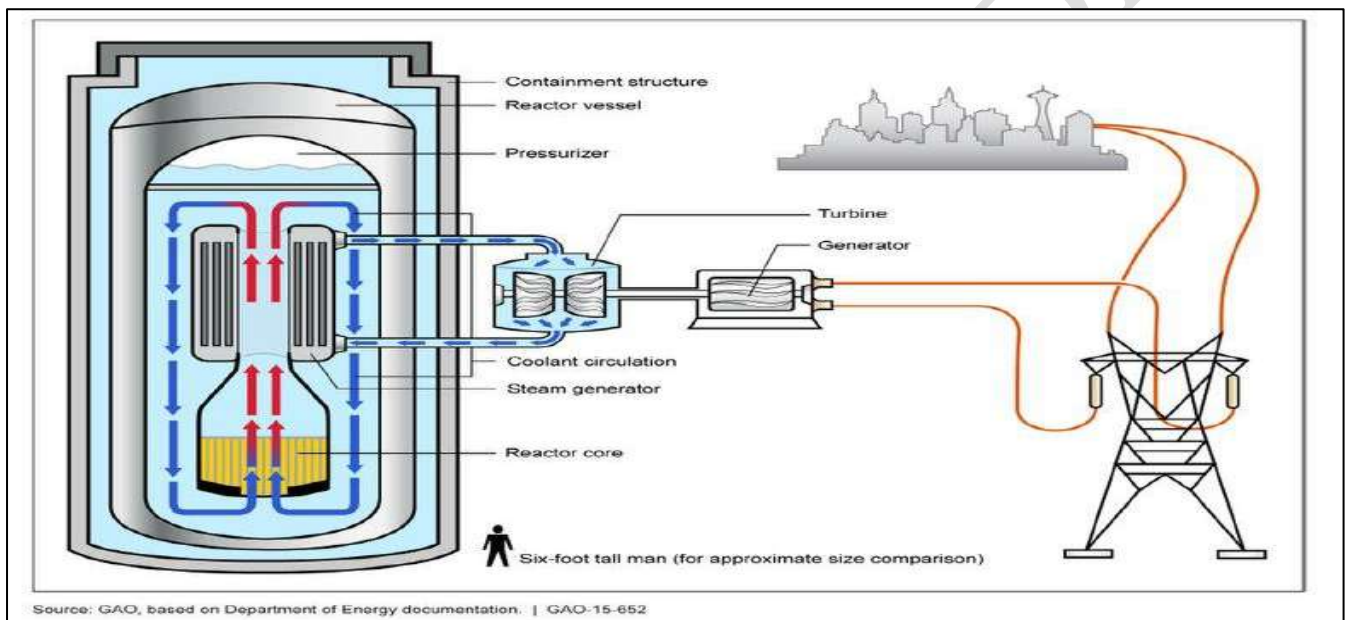
9.34 Small Modular Reactors

In the Budget 2024-25, 'Bharat Small Reactors' (BSR) has been emphasized to achieve clean energy and energy security.

- **Small Modular Reactors** – They are a class of small nuclear fission reactors, designed to be built in a factory, shipped to operational sites for installation and then used to power buildings or other commercial operations.
 - **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.



- **Types** - Reactor type and the nuclear processes may vary based on SMR designs. Of them pressurized water reactor (PWR) is the most common.
- **Capacity** – They have a power capacity of up to **300 MW(e)** per unit.
- It is about one-third of the generating capacity of traditional nuclear power reactors and can produce large amount of low-carbon electricity.



- **Refuelling** - Power plants based on SMRs may require less frequent refuelling, **every 3 to 7 years**, in comparison to between 1 and 2 years for conventional plants.
- Some SMRs are designed to operate for up to 30 years without refuelling.
- **Benefits** – Many of the benefits of SMRs are inherently linked to the nature of their design, small and modular.
- **Locational Accommodation** - SMRs can be sited on locations not suitable for larger nuclear power plants.
- **Affordability** - Prefabricated units of SMRs can be manufactured and then shipped and installed on site, making them more affordable to build.
- **Easy Construction** - SMRs offer savings in cost and construction time, and they can be deployed incrementally to match increasing energy demand.
- **SMR in India** - There are 15 pressurised heavy water reactors (PHWR) of 220 MW each being operated in India, accounts for half of India's 6780 MW nuclear power capacity.
- **PHWR to BSR** - Government is considering modifying the PHWRs pressurised heavy water reactors into BSRs.

INFORMATION TECHNOLOGY

9.35 Machine learning in Tibetan Plateau crustal movement

Recently, scientists have used Machine learning technology to predict crustal movements in Tibetan Plateau.

- **Study conducted by** - Wadia Institute of Himalayan Geology, Dehradun.
- Global Positioning System (GPS) and Machine Learning technologies were used to model the crustal deformations over the Tibetan Plateau and forecast velocity vectors of such movements.
- **CORS** - A dense network of Continuously Operating Reference Station (CORS) is employed to monitor crustal deformation continuously.
- Campaign-mode GPS surveys are often used to densify the existing CORS network.
- The scientists analysed data from 1,271 permanent continuous and campaign-mode GPS stations located on the Tibetan plateau and its surrounding areas.
- Machine learning techniques such as support vector machines, decision trees, and Gaussian process regression were used to accurately model crustal movement.
- The ML algorithm demonstrates a remarkable achievement in the field of geodetic studies in a cost-effective manner.
- Geodetic velocities predicted using machine learning are extremely precise.

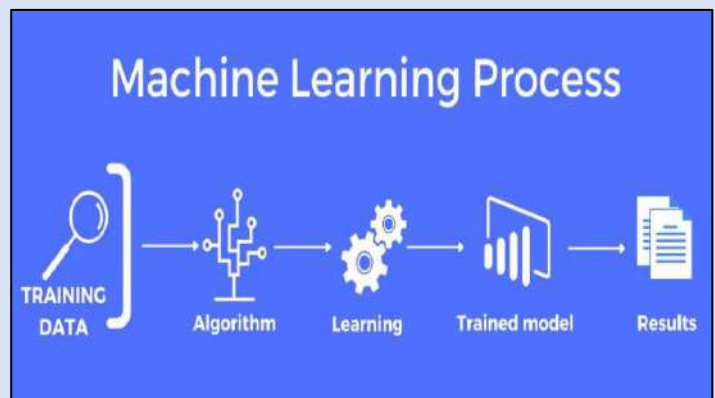
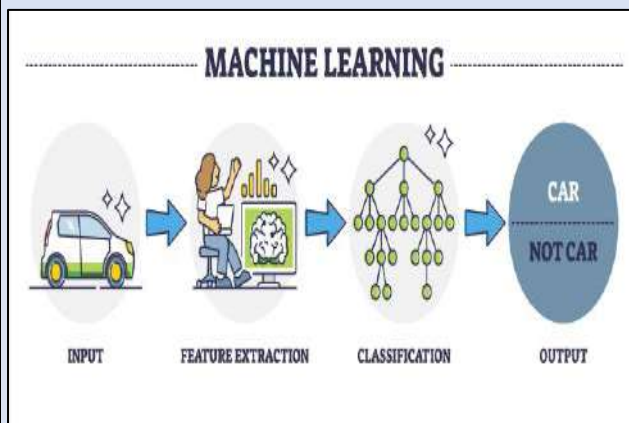
Wadia Institute of Himalayan Geology is an autonomous Natural Resources research institute for the study of Geology of the Himalaya under the Department of Science and Technology, Ministry of Science and Technology, Government of India.

***CORS** (National Survey Network) is a repositioning infrastructure operated by the Survey of India which was launched in 2023. It can provide Precise Location based service with centimetre level accuracy in real-time.*

***Geodesy** is the science of accurately measuring and understanding the Earth's geometric shape, orientation in space, and gravity field.*

Machine learning (ML)

- It is a branch of artificial intelligence (AI) and computer science that focuses on the using data and algorithms to enable AI to imitate the way that humans learn, gradually improving its accuracy.
- **Working of ML** – A Machine Learning model consists of three major functions.
- **A Decision Process** - These algorithms are used to make a prediction or classification.
- Based on some input data, which can be labelled or unlabelled, your algorithm will produce an estimate about a pattern in the data.
- **An Error Function** - An error function evaluates the prediction of the model.
- If there are known examples, an error function can make a comparison to assess the accuracy of the model.
- **A Model Optimization Process** - If the model can fit better to the data points in the training set, then weights are adjusted to reduce the discrepancy between the known example and the model estimate.
- The algorithm will repeat this iterative “evaluate and optimize” process, updating weights autonomously until a threshold of accuracy has been met.

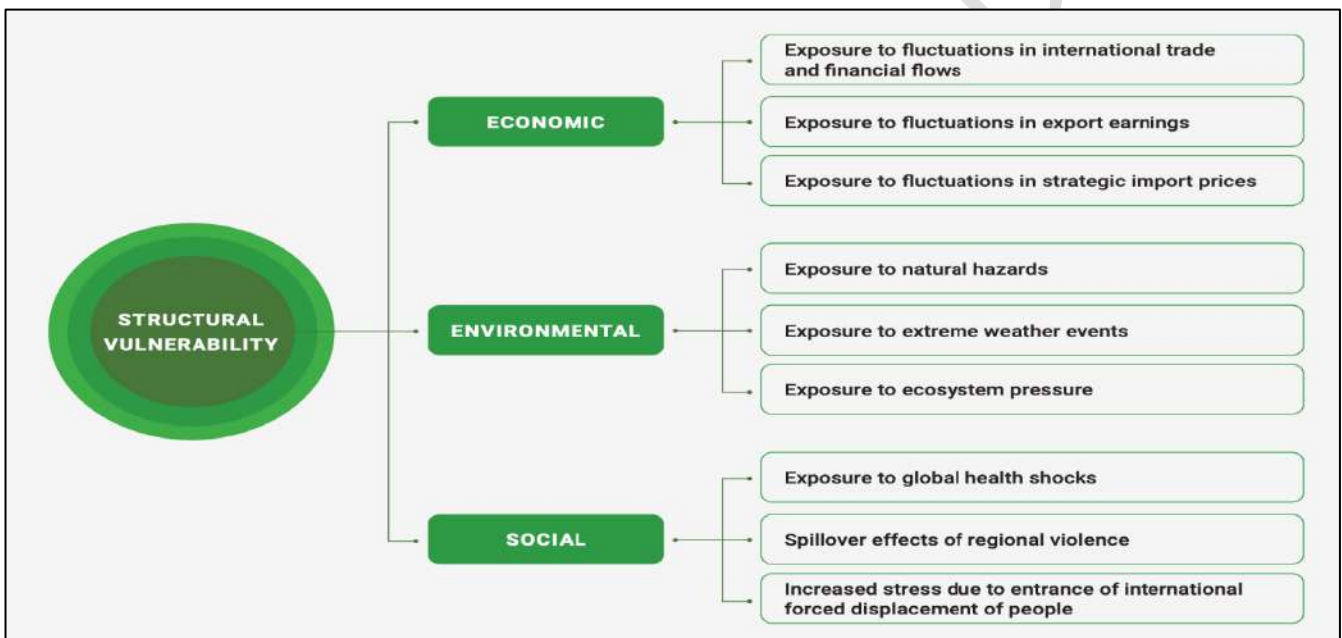


10. INDICES AND REPORTS

10.1 Multidimensional Vulnerability Index

The UN General Assembly has recently introduced a new “vulnerability” index to help small island and developing nations access low-interest financing.

- **MVI**- It is a framework developed to assess the vulnerabilities faced by Small Island Developing States (SIDS).
- It is to complement traditional metrics like Gross Domestic Product (GDP) to better assess development and vulnerabilities.
- **Agency**- *United Nations*.
- **Aim**- To provide a more nuanced understanding of the structural challenges these nations encounter, particularly in the context of global crises such as climate change, economic instability, and health emergencies.
- **Launch** – *During the 2023 Annual Meetings* of the World Bank and the International Monetary Fund, following extensive advocacy from the Alliance of Small Island States (AOSIS) and the UN.
- **Background**- Historically, SIDS has struggled with traditional measures like Gross National Income (GNI) per capita, which do not adequately capture their unique vulnerabilities.



- **Purpose**- To address this gap by considering multiple dimensions of vulnerability economic, environmental, and social rather than relying solely on income metrics.
- It is crucial for improving access to concessional financing and support for sustainable development initiatives.
- **Indicators**
 - **Structural Vulnerabilities**- Includes import dependency, exposure to extreme weather, and pandemics.
 - **Economic and Environmental Resilience**- Assesses impacts of regional violence, refugee crises, demographic pressures, and resource availability (water, arable land).
 - **Social Indicators**- Child mortality rates.
- **Implication**- It is expected to enhance the allocation of international development finance, ensuring that resources are directed towards the most vulnerable nations.

11. OTHERS

11.1 AXIS of resistance

Hamis leader Ismail Haniyeh was recently assassinated in an air strike in Tehran, Iran.

- **AXIS of resistance** - It is a coalition of *Iranian-backed anti-US and anti-Israel political and militant* groups.
- **Origin of the Name** – Its name is inspired by former US President George W Bush’s use of the term ‘axis of evil’.
- It referred to Iran, Iraq, and North Korea.
- **Group Members**
 - **Hezbollah** - Shiite militant organization
 - **Hamas** - Palestinian Sunni militant group in Gaza
 - **Palestinian Islamic Jihad (PIJ)** - Sunni Islamist militant group, Palestine
 - **Houthis** - Zaydi Shia militant group, Yemen



- **Formation of the coalition** - The Iranian Revolution of 1979 paved the way for radical Shia Muslim clerics to come to power in the Middle East region.
- Middle East was dominated by US and Israel supported Sunni-majority nations such as Saudi Arabia.
- To expand its political and military influence in a region Iran’s new regime began to support non-state actors.
- Iran has seen Israel’s creation in 1948 as a means for the US (and the West) to influence the region for its strategic interests.

11.2 International Earth Sciences Olympiad (IESO)

The Indian student team has bagged multiple prestigious medals at the 17th edition of the International Earth Sciences Olympiad (IESO).

- **IESO** – It is established in 2003 at the **International Geoscience Education Organization Council Meeting in Calgary, Canada.**
- It is an **annual** competition for secondary school students from across the globe.
- **Aim** - To generate awareness of earth sciences through teamwork, collaboration, exchanging ideas, and competition.
- **Vision** - To generate interest among the young in earth system sciences, with a focus on promoting awareness & solution-centric discussions around climate change, environmental challenges and natural disasters.
- **Competition Categories**
 - Theory and Practical
 - Earth Science Project
 - International Team Field Investigation
 - Data Mining.
- **17th Edition of IESO** - It held in Beijing, China, from August 08-16, 2024.
- **India & IESO** - India has participated in the IESO since 2007 and hosted its 10th edition in Mysore.
- The four-membered Indian team comprising students from Gujarat, Kerala, Chhattisgarh, and Rajasthan have won three gold and bronze each and two silver medals across three competition categories.
- **INESO** - To encourage the participation of Indian students (of grades 9 to 12) in IESO, the MoES supports the **Indian National Earth Science Olympiad (INESO)** held in various schools across India.
- INESO is a national-level prelude to the IESO and is facilitated annually by the Geological Society of India in collaboration with MoES.
- **Assessment topics** - Geology, Meteorology, Oceanography, and Environmental sciences.

- The MoES supports the INESO and IESO as part of the REACHOUT scheme under the [PRITHVI \(PRITHvi Vigyan\)](#) scheme.

REACHOUT - Research, Education, Training and Outreach scheme.

- It aims to support research, education, and training in Earth System Science in India.
- It is an umbrella scheme of the following 6 sub-schemes.
 - Research and Development in Earth System Science (RDESS).
 - Outreach and awareness.
 - Knowledge Resources Center Network (KRCNet).
 - BIMSTEC Centre for Weather and Climate (BCWC).
 - International Training Centre for Operational Oceanography (ITCOcean).
 - Program for development of skilled workforce in Earth system sciences (DESK).

11.3 WAVES Summit

India is going to host first World Audio Visual and Entertainment Summit (WAVES) in November 2024 at Goa.

- **WAVES** - World Audio Visual & Entertainment Summit (WAVES) is a key forum for promoting discussions, collaboration, and innovation in the Media Entertainment industry.
- **Nodal Ministry** – Union Ministry of Information & Broadcasting
- **Objective**- Bring together industry leaders and innovators to explore opportunities, address challenges, attract trade to India, and shape the future of the sector.
- **WAVES Pillars** - WAVES brings together a diverse range of stakeholders shaping the future of media and entertainment.
 - Broadcasting & Infotainment
 - Digital Media & Innovation
 - Animation, Visual Effects, Gaming, and Comics Extended Reality (AVGC-XR)
- **Create in India Challenge Season 1** – It will be held at WAVES featuring 25 competitions covering a wide range of disciplines, including animation, filmmaking, gaming, music, and visual arts, in partnership with leading industry associations and organizations.

Key Competitions

- Prasar Bharati, India's public broadcaster, will host The Battle of the Bands and The Symphony of India challenges.

11.4 Global Finance Central Banker Report Cards 2024

Recently, the RBI Governor Shaktikanta Das has been ranked as the top central banker globally for the second consecutive year by US-based Global Finance magazine.

Central Banker Report Cards

Aspect	Details
Purpose	To honour central bank governors whose strategies outperformed their peers through originality, creativity, and tenacity.
Publisher	Global Finance
Scope	Central bank governors of close to 100 countries, territories, and districts
Report frequency	Annually
First published	1994

Grading scale	A to F
criteria	Success in inflation control, economic growth goals, currency stability, and interest rate management
Grade interpretation	'A' for excellent performance, 'F' for outright failure
Aspect	Global Finance
Year founded	1987
Awards and recognition	Selects top performers among banks and financial service providers; awards are a trusted standard of excellence in the global financial community
Readership	Readers in 193 countries and territories
Audience	Senior corporate and financial officers responsible for investment and strategic decisions at multinational companies and financial institutions
Headquarters	New York
