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JUNE 2023

1. IMPORTANT TOPICS OF THE MONTH

1.1 Train Safety in India

Why in news?

The triple-train collision in Odisha's Balasore, one of the deadliest in India, raises questions about safety in rail travel.

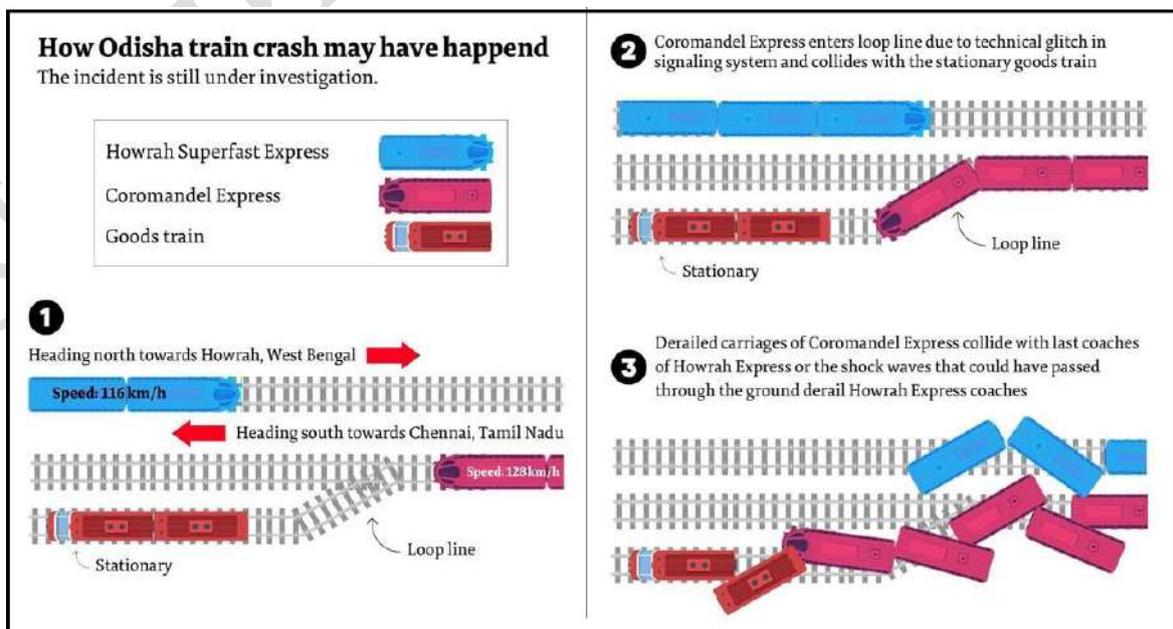
Status of Safety in Indian Railways

- The Indian Railways (IR) saw an average of about 1,390 accidents per year in the 1960s.
- The number has dramatically dropped to 80 per year in the past decade.
- **Reasons** - IR's safety record improved over the years because of -
 - The track works and its maintenance.
 - Elimination of unmanned level crossings.
- Though there is a fall in number of train accidents, the focus on safety measures of Indian Railways is still on decline.
- **CAG's Report** - According to Comptroller and Auditor General's report for the period of April 2017 to March 2021, Indian Railways recorded 2,017 accidents from 2017 to 2021.
- Derailments accounted for majority (69%) of the accidents, resulting in 293 deaths.
- Among the consequential train accidents, 55% had occurred due to negligence or failure of the Railways staff.



How did the trains collide?

- The **Coromandel Express** (Kolkata to Chennai), the **Howrah Superfast Express** (From Yeshwantpur) and a stationary goods train collided at the Bahanaga Bazar station in Balasore, Odisha.



- The Coromandel Express headed towards Chennai, collided with the goods train stationed and derailed, after failure of signal.
- The derailed train coaches fell on and derailed the last few coaches of the Howrah Superfast Express which was passing by.
- The tragic collision led to the death of nearly 300 passengers.
- None of the trains in the crash were equipped with anti-collision equipment nor was the section covered by **Kavach System.**
- The accident has drawn attention to the safety preparedness of the Indian Railways.

What are the existing concerns over Indian Railways?

- **Staffing** - Understaffing in safety categories of work. Huge number of vacancies causes excessive stress on existing employees making them susceptible to make mistakes.
- **Expenditure** - Misuse or underuse of funds allocated for enhancement of safety mechanisms.
- **Control of Authority** - Dual control of the Commission of Railway Safety (CRS) where the committee is originally under the administrative control of Civil Aviation Ministry and the Commissioners are mostly from Railways.
- **Timeframe** - Railway departments delay in answering the Action Taken reports of CRS.
- **Legal upper hand** - Railway act of 1989 provides exclusive control to modify the rules to the Railways.
- **Technology** - Implementation and integration of upgraded technology in major tracks and services.

What are the recommendations for the future safety?

- The CAG's 2022 report on '**Derailments in Indian Railways**' had flagged multiple shortcomings and made several recommendations.
- **Administrative** - Railway system needs to prioritize safe tracks and collision protection.
- Vacancies in safety categories should be filled up post haste.
- Improving the skill of workmen and other existing employees.
- **Financial** - The Centre pumping substantial funds into Indian Railways (IR), so the IR should upgrade its systems when finance is not a problem.
- The *Rashtriya Rail Sanraksha Kosh (RRSK)*, a special fund created by the Centre in 2017 to ramp up railway safety should be judicially utilized
- With indigenous signalling system like Kavach which costs far less than the imported ETCS (Level II) system, its implementation could cover more area.
- **Technical** - With 18 'Train 18s' (Vande Bharat) till date, operations to higher speeds should be made more convenient by inducting proper technology.
- Enhancement of safety and improvement in the capacity of the tracks should be done to run more trains.
- Renewal of complete track structure including sleepers with deep screening and provision of thick web switches should be done.

Existing Safety Mechanisms

Automatic Signaling (ABS)

- To increase line capacity to run more trains on existing High Density Routes of Indian Railways.

Interlocking

- Provision of Electronic Interlocking (EI) to increase Safety and Flexibility to avoid collision of trains. So far 2837 stations have been provided with Electronic Interlocking covering 44% of IR.

Interlocking of Level Crossing Gates

- Safety at Level Crossing Gates (manned/unmanned) has been a major area of concern.

SigDATE

- Signal Design Automation Tool for Electronic Interlocking (SigDATE), an indigenously developed automatic Route Control Chart generating system has been introduced to expedite infrastructural works, improving efficiency & enabling safe train operations

KAVACH

- The Train Collision Avoidance system (TCAS) or KAVACH is an indigenously developed comprehensive signalling system. Kavach overrides the driver in case of any unsafe situation and activates the train's braking system automatically.

- **Supervision** - As far as CRS is concerned, instead of a single Commissioner heading an inquiry, in cases of serious accidents, the inquiry should be conducted by a panel of Commissioners.

Commission of Railway Safety (CRS)

- Commission of Railway Safety is a government body that acts as the railway safety authority in the country.
- CRS is headquartered in Lucknow, Uttar Pradesh.
- It is under the administrative control of the Ministry of Civil Aviation (MoCA).
- Such cross control is made to keep the CRS insulated from the influence of the country's railway establishment and prevent conflicts of interest.
- **Functions** - CRS deals with matters related to safety of rail travel and operations.
- It also does other statutory functions like inspectorial, investigatory, and advisory as laid down in the Railways Act, 1989.
- Investigating serious train accidents is one of the key responsibilities of the CRS.

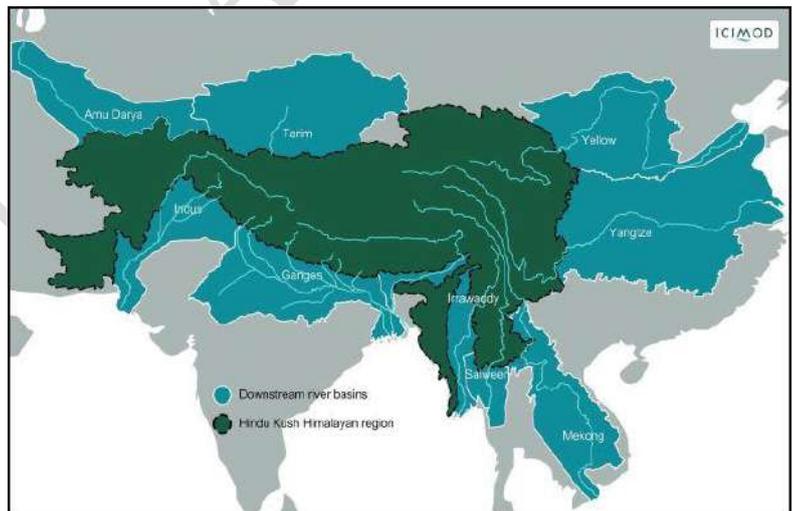
1.2 ICIMOD Report on Hindu-Kush Mountains

Why in news?

The report 'Water, ice, society, and ecosystems in the Hindu Kush Himalaya' was released by the International Centre for Integrated Mountain Development (ICIMOD).

What is the geographic extent of the Hindu-Kush Mountains?

- The Hindu Kush Himalaya (HKH) region extends 3,500 km over 8 countries from Afghanistan in the west to Myanmar in the east.
- **Range Countries** - Afghanistan, Pakistan, India, Nepal, Bhutan, China, Bangladesh and Myanmar.
- The HKH region, harbours the highest mountain ranges in the world.
- It also contains the largest volume of ice on earth outside of the polar areas and is called '**Third Pole**'.
- The range is also the source of major Asian river system and called as '**Water tower of Asia**'.



What is the significance of HKM?

- The glaciers of the Hindu Kush Himalaya are a major component of the Earth system.
- Ice and snow in the HKH are an important source of water for 12 rivers that flow through 16 countries in Asia.
- The basins of these rivers provide freshwater and other vital ecosystem services to 1.9 billion people, a fourth of the world's population.
- **Buffer** - Glaciers act like a 'buffer' in the hydrological cycle.
- As more snow reaches the top, it is stored as ice for decades and centuries, which will be eventually released as meltwater in the dry months.
- Himalayan glaciers disappeared 65% faster in the 2010s than in previous decade.

HKM in India

The entire territory of 11 mountain states & Darjeeling district of West Bengal state are included in the HKH region. The 11 states are Assam, Uttarakhand, Himachal Pradesh, Manipur, Jammu & Kashmir, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, and Arunachal Pradesh.

What are the issues in adaptation measures?

- **State support** - Governments played a limited role in helping mountain communities of the HKH adapt to climate change.
- **Adaptation fund** - The adaptation in the mountains is expensive, but the investment has been low.
- **Geopolitics** - The HKH countries are not as organised as Small Island Developing States.
- **Database** - Adaptation in one place might end up being maladaptation in another.
- Hence, data sharing is very important and the HKH range countries should come up with regional adaptation mechanism.

What does the ICIMOD report say?

- The ICIMOD's report 'Water, ice, society, and ecosystems in the Hindu Kush Himalaya' highlights the changes and consequence of loss of snow in HKH.
- HKH glaciers could lose up to 80% of their current volume by 2100 in a business-as-usual scenario.
- The average temperature in the region has increased by 0.28°C per decade between 1951 and 2020.
- Contribution of water from glaciers to Ganges, Brahmaputra and Indus will increase through 2050, then decrease by 2100.
- Rivers in the Eastern Himalayas get less water from glacial melt. Still, the perennial nature of several rivers could be lost.
- Biodiversity in Hindu Kush Himalayas will suffer even if the global temperature rise is maintained at 1.5 °C.

Consequences of loss of HKH

Climate change

- Climate change is driving unprecedented and irreversible changes in glaciers, snow and permafrost of the Hindu Kush Himalayas.

River system

- As a consequence, major rivers in the Himalayas including those in eastern and north-eastern India are set to suffer.

Water availability

- Water availability in the Ganges, Indus and other basins in the HKH is set to increase in the short term and decrease in the long term.

Disasters

- Natural hazards like floods and landslides are projected to increase over the coming decades.

Invisible Impacts

- The benefits that the lowlands or the economic hotspots get from the mountains is not quantifiably known.

International Centre for Integrated Mountain Development (ICIMOD)

- It is an intergovernmental institution leading the global effort to protect the Hind-Kush Mountains.
- ICIMOD is based in Kathmandu, Nepal.
- It has 8 regional member countries - Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan.

G.S PAPER I

2. GEOGRAPHY

2.1 Effects of Cyclone on the Monsoon

Why in news?

Cyclone formations are seen in the pre-monsoon cyclone season, closer to the monsoon onset.

What is monsoon?

- Indian Monsoon is the seasonal reversal of winds during a year accompanied by corresponding changes in precipitation.
- The monsoon or southwest monsoon is a sea-breeze from the Arabian Sea and the Bay of Bengal that officially onsets over Kerala on June 1 and retreats from Rajasthan by the end of September.

- It is then replaced by the retreating, or northeast monsoon in November which is the key source of rainfall for several parts of Tamil Nadu, Andhra Pradesh and north interior Karnataka.
- The monsoon is affected by
 1. The 3 tropical oceans namely, Indian, Atlantic, and Pacific.
 2. The 'atmospheric bridge' from the Arctic.
 3. The oceanic tunnel as well as the atmospheric bridge from the Antarctic Ocean.
 4. [Global warming](#) also affects the cyclones over the Indian Ocean and the typhoons over the north-western Pacific Ocean.

Why does a cyclone's position matter?

- The location of the cyclone is critical for the transition of the monsoon trough.
- Some cyclones in the North Indian Ocean have had both positive and negative impacts on the onset of the monsoon.
 - **For example:** The circulation of winds around the cyclones in the northern hemisphere is in the anticlockwise direction.
- If a cyclone lies further north in the Bay of Bengal, the back-winds blowing from the southwest to the northeast can pull the monsoon trough forward, and assist in the monsoon's onset.
- **Anticyclones** - Super Cyclone Mocha's northwest to east trajectory over the Bay was the result of unusual [anticyclones](#) over the Arabian Sea and the Bay of Bengal.
- The back-winds of [Cyclone Mocha](#) helped the monsoon set in on time over the Andaman and Nicobar Islands.
- The anticyclones have warmed both the Arabian Sea and the Bay of Bengal by more than 1°C in the pre-monsoon season.

A 'bridge' refers to two faraway regions interacting in the atmosphere while a 'tunnel' refers to two remote oceanic regions connecting within the ocean.

Reasons	States
Depression and cyclonic storms	Coastal areas of Orissa, West Bengal, Andhra Pradesh, Karnataka, Tamil Nadu
Cloud bursts	Arunachal Pradesh, Assam, Orissa, Himachal Pradesh, Uttarakhand, the Western Ghats in Maharashtra, Kerala
Breaches in embankments	Assam, Bihar, Uttar Pradesh, Orissa and Andhra Pradesh

How southwesterly winds impact monsoon?

- **Southwesterly** are the winds that blow from the Southwest direction.
- Southwesterly winds over the Arabian Sea bring large quantities of moisture onto the Indian subcontinent.
- On the other hand, southwesterly winds over the Bay of Bengal are bad news for the monsoon.
- The monsoon winds over the southern Bay of Bengal sweep in from the southwest and west, but they turn around and head northwest towards India from the southeast.

How monsoon is impacted differently now?

- The strong southwesterly winds over the Bay of Bengal feeds the monstrous typhoons over the Northern Indian Ocean, South China Sea and the north-western Pacific Ocean.
- The monsoon trough struggles to get through these strong southwesterly winds.
- Global warming affected cyclogenesis wrench the dynamics of the monsoons, the onset and its evolution.
- The monsoon trough had a very reliable annual migration northwestward and the withdrawal southeastward.
- The annual pattern has changed due to effects of climate change.

The monsoon trough is a low-pressure region that is a characteristic feature of the monsoons.

Cyclones		
Cyclone Biparjoy	Cyclone Mawar	Cyclone Guchol
<ul style="list-style-type: none"> It is not interacting much with the monsoon trough. The late birth of cyclone Biparjoy as well as the late onset of the monsoon are both closely related to typhoons in the north-western Pacific Ocean. 	<ul style="list-style-type: none"> Qualified as a 'super typhoon', thus far Mawar is the strongest typhoon to have taken shape in May. Mawar pulled winds across the equator into the North Indian Ocean, setting up southwesterly winds over parts of the Arabian Sea and the Bay of Bengal. 	<ul style="list-style-type: none"> Severe tropical storm Guchol in the east of the Philippines and is likely to continue northwest before turning to the northeast. Winds are blowing strongly towards the north-eastward over the Bay, making the monsoon trough to struggle to reach Kerala.

2.2 Flash Floods

Why in news?

Flash floods were witnessed in Khotinallah near Aut (in HP) on the Pandoh–Kullu stretch due to a heavy downpour and the Chandigarh-Manali highway was blocked.

What are flash floods?

- Flash floods are *sudden* and *rapid flooding* events that happen within a short period of time.
- Flash floods are *highly localised* but causes *high damages* because of suddenness.
- This occurs in hilly regions and sloping lands where heavy rainfall and thunderstorms or cloudbursts are common.
- Low-lying areas, such as riverbeds, canyons, and urban areas with poor drainage systems are also prone to it.

How India is vulnerable to flash floods?

- In India, flash floods are often associated with *cloudbursts*.
- Himalayan states and Western Ghats in Maharashtra and Kerala are more vulnerable to flash floods caused by cloud bursts.
- Himalayan states further face the challenge of *overflowing glacial lakes*, formed due to the melting of glaciers.

- Other factors of flash floods includes sudden release of waters from upstream reservoirs, breaches in landslide dams, embankments on the banks of the rivers, depression and cyclonic storms

How dangerous are flash floods?

- Flash floods can occur without warning, catching people off guard and leaving *little to no time* for preparation and evacuation.
- Due to their speed and *unpredictability*, water levels can reach several feet in just a few minutes.
- They pose a significant *threat to life*, along with property and infrastructure.
- Flash floods accompanied by *landslides* further exacerbate the damage.

What are the mitigating measures?

Reasons for frequent floods

Season

- According to the National Disaster Management Authority (NDMA), nearly 75% of the total Indian rainfall is concentrated over a short monsoon season of four months (June to September).

Climate change

- Rapid melting of glaciers in glacial lakes as an impact of global warming.

Manmade reasons

- Factors such as population growth, rapid urbanisation, increased developmental and economic activities in flood plains contribute to the increasing flood damage.

Wildfires

- Wildfires destroy forests and other vegetation, which in turn weakens the soil and makes it less permeable for water to seep through.

- Comprehensive strategy of **monitoring** on the ground in hilly areas.
- **Planning development works** in a way that is sensitive to the region's ecology and mitigation to reduce the extent of damages due to flash floods and landslides.
- **Early warning systems**, such as weather forecasts and monitoring of river levels are key to mitigating the risks associated with flash floods.
- Public education on flood **preparedness** and evacuation procedures.

According to National Flood Commission, about 40 million hectares of land in the country are liable to floods and an average of 18.6 million hectares of land are affected annually.

Quick Facts

Cloudbursts - Sudden, intense rainfall in a short period of time.

Landslides - Sudden movements of rock, boulders, earth or debris down a slope.

- **Natural causes** - Heavy rainfall, earthquakes, snowmelting and undercutting of slopes due to flooding.
- **Manmade causes** - Excavation, cutting of hills and trees, excessive infrastructure development, and overgrazing by cattle.

2.3 India and China: Demographic dividend

Why in news?

Last March, the World Population Review claimed India's and China's populations stood at 1.428 billion and 1.425 billion respectively and both are clueless as to how to solve soaring youth unemployment.

What is 'Demographic dividend'?

- Demographic dividend refers to the growth in an economy that is the result of a *change in the age structure* of a country's population.
- It occurs when the proportion of working people in the total population is high.

Status of Unemployment in China	Status of Unemployment in India
<ul style="list-style-type: none"> • The World Population Review announced China's youth population was declining and the ageing population was rising. • As per the report in a popular Chinese online journal, 'one out of every five young urbanites are without work'. • Reasons - Supply-demand contradiction due to pandemic hit years. • China's economic growth focus shifting from quantitative to qualitative growth. • China's vocational education stream is perceived as unattractive, compared with regular schools that lead to academic careers. 	<ul style="list-style-type: none"> • India is the most populous countries in the world with good demographic dividend. • The Centre for Monitoring Indian Economy, a private organization (CMIE), estimates India's unemployment rate in India is around 7.45% as on March 2023. • Reasons - India face a shortage of skilled personnel and many hands-on specialties. • India's challenges ranges from numbers of school leavers to liberal arts graduates from universities and engineers from low-grade colleges who cannot find jobs.

What are the issues in skilling in India?

- **Short term courses** - Entities such as the National Skill Development Corporation (NSDC) focused on short courses which is insufficient for real skill acquisition.
- **Autonomy** - Industrial Training Institutes (ITIs) established after the 1960s are run by state governments and they resist transferring full control to their industrial partners.
- **Inadequate training** - Many engineering colleges give inadequate training and the mushrooming private skilling institutes partly fills the gap.
- Segmenting the school stream in the 'middle school' level requires for the real shift to skilling.

- **Lack of vocation focused schools** - NEP 2020 aims to introduce vocational training in middle school but there are no vocation-focused schools to continue at secondary level.

What are the differences between Indian and China?

- **Similarities** - Both the countries consider vocational courses as secondary and focus on academic careers.
- **Differences** - The Indian youth do nothing remotely resembling China's 'lie flat' phenomenon.
- 'Lying flat' (tang ping in Chinese) means taking a break from relentless work, a movement that took off during 2021 in China.
- Indian youth chase varied options like pursuing the dream of prosperous foreign lands.
- Their targets range from the US, the UK, the Gulf region, Europe, Africa and unexpected places like Malta and Japan.

Solutions

Job creation	• Job creation has to be the topmost priority in both the countries.
Skilling	• Skilling to effective outcome levels, should be our constant goal.
MSMEs	• MSMEs the major employment creators should be boosted enough.
IT capabilities	• IT capabilities which are India's innate asset must be valorised.
Manufacturing sector	• It should also be given focus at the same time without any neglectation.

3. SOCIAL ISSUES

3.1 COVID's Impact on Child Labour

Why in news?

The economic downturn and huge health costs triggered by the pandemic have increased the number of child labours across the country.

What is Child labour in India?

- The Child Labour (Prohibition and Regulation) Act of 1986 defines 'child' as any person below the age of 14.
- Child labour is the employment of a child in any employment including as a domestic help.
- It does not include helping own family in non-hazardous occupations.

Constitutional Provision	Legal Provision
<ul style="list-style-type: none"> • <u>Article 21A</u> of the Indian Constitution was added to prevent child labour and provide free education to them. • It mandates that the State shall provide <u>free and compulsory education</u> to all children of the ages of <u>6-14 years</u> in the manner prescribed by the State. 	<ul style="list-style-type: none"> • The <u>Right of Children to Free and Compulsory Education</u> (RTE) Act of 2009, gave affect to this constitutional provision. • '<u>Compulsory Education</u>' casts an obligation on the appropriate authorities to ensure admission and sustenance of compulsory elementary education for such children.

How Covid-19 has impacted the vulnerable sections of India?

- The Covid-19 pandemic has brought the world to its knees.
- The pandemic exposed multiple fault-lines in the healthcare, education, economic, and job-related sectors.
- The effect of the pandemic has been deep and long lasting among the marginalised sections of society, especially women and children.

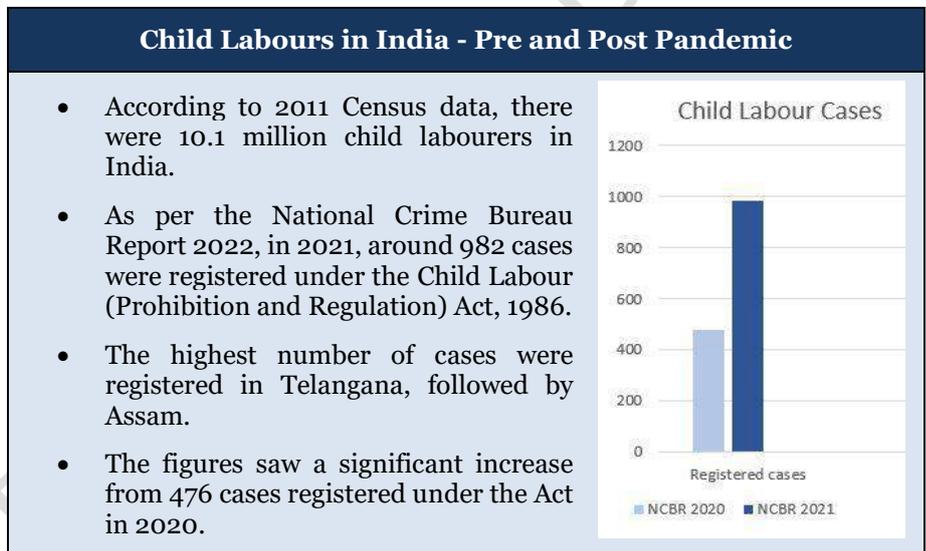
- **Effects** - Households in poor economic conditions were pushed to the brink of poverty.
- These conditions have exacerbated the social inequities and exposed women and children to abuse, violence and lack of security.

How Covid-19 has impacted child labour in India?

- **Adolescents** - The RTE Act leaves the children between the ages of 14-18 years (adolescents) out of its purview.
- Moreover, the Child Labour Act allows adolescents to engage in work if it does not qualify under hazardous occupations. This section of the children become most prone to the perils of child labour.
- **Breadwinners** - The pandemic triggered economic downturn has put excessive pressure on children to be income earners for the family.
- **Reasons**
 1. Adult family members have lost their jobs
 2. Adult family members have not survived the pandemic.
 3. Catastrophic health costs associated with the pandemic
- **Hazardous occupations** - The above reasons has driven children to take up work in exploitative and hazardous circumstances.
- Closure of schools globally has also led to a surge in child labour around the world.

What should be done to the rescued child labours?

- **Post-rescue Rehabilitation** - Children after rescued from the jobs where they were employed illegally should be given rehabilitation.
- **Implementation of RTE** - A stronger implementation of RTE, in terms of mobilisation of resources and all the actors in the ecosystem along with a robust infrastructure.
- **Awareness at hotspots** - Literacy awareness programmes targeting primary education for children must be undertaken by local authorities, especially in regions where the number of child labourers is high.
- **Including adolescents** - These rehab and awareness programmes must also consider adolescents who are not covered by RTE and are forced to work in hazardous environments.
- **Synergy of policies** - Policies amplifying the spread of education and curtailing child labour should be cohesive and complementary in nature.
- **Mental health** - The special care and protection for these children should be extended taking their mental and physical immaturity into account.



3.2 Dowry deaths

What is dowry?

- **Dowry Prohibition Act of 1961** defines dowry is any kind of property or valuable security directly or indirectly agreed to be given by one party to another party to the marriage.
- The **Section 304-B of Indian Penal Code (IPC)** defines dowry death and provides for its punishment.
- The death of woman is caused by any burns of bodily injury or occurs otherwise than under normal circumstances within seven year of her marriage in connection with any demand or cruelty or harassment for dowry is considered dowry death.

What are the legal provisions against dowry death?

- **Indian Penal Code, 1860** - Section 304B of the Indian Penal Code defines dowry death and provides for the stringent punishments for the offenders.
- Punishment for dowry death ranges from a minimum sentence of imprisonment of 7 years and a maximum sentence extending to imprisonment for life.
- **Code of Criminal Procedure, 1973** - Under Section 41 of CrPC, dowry death is a non-bailable offence.
- The police have the authority to arrest any person without issuing of any warrant along with the authority to carry out the investigation with or without the permission of magistrate of a court.
- **The Dowry Prohibition Act, 1961** - The exclusive act to deal with the dowry system prevalent in India.
- The Act lays down a certain set of preventive and punitive measures.
- Any property or valuable security from one side to another either given or agreed to be given in future directly or indirectly in connection with marriage amounts to dowry.
- Giving or taking of dowry is punishable with a minimum term of 5 years and a fine up to Rs 15,000 or to the extent of the value of dowry whichever is more.
- These offences are non-bailable and cognizable.

Reasons for dowry menace

Traditions

- The age old practice is perceived as a quintessential custom in marriage.

Matter of reputation

- People believe that dowry giving or receiving gives reputation within the society.

Illiteracy

- It is the penultimate factor behind the lack of understanding legal escapes.

Patriarchy

- Women are treated as subordinate and men as superior.

Groom price

- The qualification of groom is seen as the benchmark of dowry prices.

What should be done?

- **Society** - Societal change and widespread awareness.
- Keeping women on par with men and making them independent of men.
- **Literacy** - Educating and empowering women.
- Women reservation has to be taken as a source of women empowerment.
- **Fair usage** - Strict adherence to laws against dowry.
- **Avoiding escalation** - Early reporting of domestic violence related to dowry can reduce dowry deaths.
- **Discourage misuse** - The dowry laws should be used to curb the menace and not to be misused to defame or slander one's name.

3.3 Adolescent Girls' Nutrition

Why in news?

To unlock the full potential of India's future, we have to prioritise the health and nutrition of its adolescent girls.

Status of adolescent girl's health in India

Data	Concern on Nutrition	Environment
<ul style="list-style-type: none"> • According to National Family Health Survey-5 (NFHS-5), <u>59.1%</u> of adolescent girls are anaemic. 	<ul style="list-style-type: none"> • The numbers showcase a worrying trend of adolescent girls' health in India. 	<ul style="list-style-type: none"> • Lack of <u>gender-neutral environment</u> within a household affects the nutrition uptake in adolescent girls.

Importance of adolescent girls' health

Complex issues

Tackling the complex issue of nutrition among adolescent girls is not just a health concern but also an investment in India's future. Adolescent girls are particularly vulnerable to undernutrition and anemia due to the onset of menstruation.

Second window

Adolescence is a pivotal period of cognitive development, thus improving access to nutrition. Adolescent nutrition compensates for any nutrient deficiencies acquired during early developmental stages in the girl child.

Female demographics

Adolescent health is a significant indicator of women's labour force participation in India in the long term. Investing in nutrition interventions in adolescent girls has potential returns in the form of greater and more sustainable economic growth of the nation.

What are the consequences of lack of adolescent girl nutrition?

- Poorly balanced and insufficient diets impairs cognitive ability affecting one's academic performance.
- The lower educational attainment can limit opportunities for employment and economic self-sufficiency.
- Undernourished adolescent girls are also at a higher risk of chronic diseases and pregnancy complications.
- A higher health-care burden on families and communities, leads to financial instability and increased poverty.
- Complete female participation in work, politics, or community involvement is affected if girls' health is affected.

What could be the government's approach in this sense?

- Investing in girls' nutrition is state's moral as well as economic obligation.
- **Redefine** - Focus shift to redefine interventions in adopting a life-cycle approach leaving no girls behind to break the intergenerational cycle of poverty.
- A few strategic modifications to existing interventions can significantly expand the scope of its outcomes.
- The convergence of various government initiatives such as the Scheme for Adolescent Girls (SAG) within the umbrella of the POSHAN 2.0 is a step in the right direction
 - For Example: [Rashtriya Kishor Swasthya Karyakram](#) (RKSK)
- **Social Change** - Targeted and regionally contextualised Social and Behaviour Change Communication (SBCC) efforts around adolescent girls' nutrition.
- **Implementation changes** - Effective convergence and collaborations among all the relevant departments to foster a collective endeavour.
- **Holistic narrative** - Evidence/data backed narrative effectively appeals to all, even to those outside the technical community.
- The nutrition of adolescent girls' and their mental and physical well-being, individual productivity and overall economic growth of the country should all be brought under one framework.

G.S PAPER II

4. INDIAN POLITY

4.1 Parliamentary Democracy in Present India

Why in news?

The controversies around the inauguration of new Parliament building overlooked in India's 'parliamentary democracy.'

What are the existing issues with Indian Parliament?

- There is an increasing subordination of the 'Parliament' in the 'Parliamentary democracy' of India.
- Bills are passed with minimal or no deliberation.

- Parliament sits for fewer and fewer days in a year, and parliamentary sessions are often adjourned.
- The presidential ordinances have become a parallel if not dominant form of law-making.
- The executive power of India is great that resembles presidential system, but without the checks and balances and veto points that those systems have these as well are ineffective.

How India dilutes this Constitutional design?

- **Intra-party Dissent** - The possibility of intra-party dissent within Parliament has been stamped out by virtue of the Tenth Schedule to the Constitution (anti-defection law).
- **Opposition** - The Indian Constitution did not carve out any specific space for the political Opposition in the House, right from the beginning.
- The manner of proceedings in Parliament has no real constitutional checks upon how that control is exercised.
- **Speaker** - The Speaker, in our system, is not independent.
- The Speaker is not required to give up membership of their political party.
- Speakers acting in a blatantly partisan manner in order to advance the interests of the executive over the interests of the House affect the quality of the deliberations in the lower house.
- It also negates the scrutiny of Rajya Sabha. For example, classifying a bill as 'money bill'.
- **Upper House** - The role of the Upper House is undercut by the constitutionally-sanctioned ordinance making power.
- It is used as a parallel process of law-making, especially to bypass the Upper House altogether.

Is an actual check upon executives possible?

- When there is a single, majority ruling party, the above dilution of checks and balances is diluted and Parliament can do very little.
- The only effective check upon the executive is when the ruling party is forced to govern in a coalition with allies with different opinions.
- The morphed executive democracy of India would require constitutional changes and reforms to return to parliamentarianism.

Limitations on the Parliament functioning

Constitution

- The Indian Constitution, by its very structure, facilitates and enables the marginalisation of Parliament. It enables the concentration of power within a dominant executive.

Intra-party Dissent

- In order to enact its agenda, the executive must command a majority in Parliament. This gives space for intra-party dissent and for the non-cabinet parliamentarians to exercise a check over the executive.

Opposition

- The Opposition has certain limited control over parliamentary proceedings.

Speaker

- The interests of Parliament against the executive are meant to be represented by the Speaker, a neutral and independent authority.

Bicameralism

- A second 'Upper House' that acts as a revising chamber, where interests other than those of the majority are represented. In India's case, 'Rajya Sabha' is the second upper house.

In the case of Aadhaar Act, Rajya Sabha scrutiny was avoided by simply classifying the Bill as a 'money bill' by the Lok Sabha Speaker.

4.2 Model Prisons Act 2023

Why in news?

The Ministry of Home Affairs (MHA) finalized the preparation of the Model Prisons Act, 2023 which aims to replace the colonial-era prison laws.

What is the need for Model Prisons Act 2023?

- Increasing spate of killings and gang violence within prisons.
- Existence of criminal nexus operating from inside prisons in Delhi, Punjab, Haryana, and Rajasthan.
- The law is too old and there is need for the changing times.
- India's incarceration system was set up by the British to subjugate political prisoners.
- New perspectives evolving on prisons and prison inmates globally in the last few decades.
- Prisons not seen as places of retributive deterrence but instead as reformatory and correctional institutions.

What are the key features of Model Prisons Act 2023?

- **Security assessment and segregation** - Security assessment of all prisoners to determine their risk level.
- Prisoners who are considered to be a threat to themselves or others will be segregated from the general population.
- **Individual sentence plan** – The plan outlines their rehabilitation goals and will be developed in consultation with the prisoner, their family, and the prison staff.
- **Grievance redressal mechanism** - For prisoners to file complaints about their treatment in prison.
- **Prison development board** - To oversee the implementation of the Act and to make recommendations for improvements to the prison system.
- **Separate accommodation** - For women prisoners and transgender and prisoners with disabilities.
- **Technology in prison administration** - The Act allows for the use of technology in prison administration such as video conferencing with courts and electronic monitoring of prisoners.
- **Different types of jails** - To establish and manage high security jails, open jails, and semi-open jails.
- **Legal aid** - To prisoners who cannot afford to hire a lawyer.
- **Awards inmates with good conduct** - Provides for [parole](#), furlough, and premature release to prisoners who have demonstrated good conduct.
- **Reintegration into society** - The Act emphasizes the need for vocational training and skill development for prisoners to help them reintegrate into society after they are released from prison.
- **Humane** – The Act will help to create a more humane prison system helping to reduce recidivism.
- **Guiding document** – The Act may serve as a guiding document for the States so that they may benefit from its adoption in their jurisdictions.

What the pros and cons of the Act?

Advantages	Shortfalls
<ul style="list-style-type: none">• Focus on keeping criminals in custody and enforcing discipline and order in prisons, leaving no provision for reform and rehabilitation of prisoners.• A comprehensive law that aims to reform the prison system in India.• Address the shortcomings of the existing Prisons Act of 1894, which is over 130 years old.• If implemented effectively, it will improve the lives of prisoners in India.	<ul style="list-style-type: none">• The subject of prison falls on the state subject so the act is just a framework and non-binding on states.• Does not address the issue of overcrowding in prisons.• Does not address the issue of lack of resources in prisons and shortage of prison staffs.• Does not address the issue of discrimination in prisons.

4.3 Obscenity Laws in India

Why in news?

The Kerala High Court's recent decision in the Rehana Fathima obscenity case draws attention to the definition, or lack thereof, of obscenity in Indian law.

What was the case about?

- In 2020, activist Rehana Fathima posted a video showing her 14-year-old son painting on her semi-nude torso.
- It triggered widespread outrage on social media for subjecting her children to an obscene and vulgar act.
- She was filed under various provisions of the *Protection of Children from Sexual Offences Act of 2012 (POCSO)*, *the Juvenile Justice Act of 2015* and *the IT Act of 2000*.

Kerala High Court Ruling		
Ruling	Double Standards	Bodily Autonomy
<ul style="list-style-type: none"> • It said that the mere sight of the naked upper body of the woman should not be deemed to be sexual by default. • The depiction of the naked body of a woman cannot per se be termed to be obscene, indecent or sexually explicit. • Nudity can constitute obscenity but the obscenity under the law must be determined '<u>only in the context</u>' of the depiction. 	<ul style="list-style-type: none"> • The bodily autonomy and agency of women is under constant threat due to the existing patriarchal structure. • The half-nude body of a man is conceived as normal and not sexualised, but a female body is not treated in the same way. 	<ul style="list-style-type: none"> • The Supreme Court's judgment in <i>Justice K.S. Puttaswamy (Retd) v. Union of India (2018)</i> highlighted the bodily autonomy of women. • The Court underscored that the right of a woman to make autonomous decisions about her body is at the very core of her fundamental right to equality and privacy.

How obscenity is viewed under Indian laws?

- There is *no comprehensive definition* of obscenity in law.
- Until 2014, the judiciary used the Victorian-era '*Hicklin test*' to determine if something is obscene or not.
- In 2014, the apex court applied the '*community standards test*' instead of the Hicklin Test while hearing the case of *Aveek Sarkar & Anr vs State Of West Bengal and Anr*.
- In 'community standards test' obscenity has to be judged from the point of view of an average person, by applying contemporary community standards.
- A nude picture cannot be called obscene unless it has the tendency to arouse the feeling of an overt sexual desire.

Obscenity Laws in India
<ul style="list-style-type: none"> • Section 292 of the IPC stipulates that any content is deemed obscene if it is lascivious or appeals to the prurient interest, or if its effect tends to deprave and corrupt persons likely to read, see or hear the content. • This provision prohibits the sale or publication of any obscene pamphlet, book, paper, painting, and other such materials.
<ul style="list-style-type: none"> • Section 293 of the IPC criminalises the sale or distribution of obscene objects to anyone who is under the age of 20, or an attempt to do so.
<ul style="list-style-type: none"> • Section 294 of the IPC prohibits obscene acts and songs in public spaces.
<ul style="list-style-type: none"> • Section 67 of the IT Act, 2000 says that anyone who publishes or transmits obscene material in electronic form can be punished.

What is the way forward?

- **Define** - The forms of obscenity must be more strictly defined in law keeping in mind existing societal realities in order to curb its misuse.
- **Misuse of law** - Obscenity laws are often indiscriminately invoked to stifle free speech and such misuse should be controlled.
- **Exploitation of minors** - The aim of such laws should be to penalise the exploitation of minors, such as child pornography cases, instead of regulating consensual acts of adults.

4.4 Mekedatu Dam Dispute

Why in news?

The governments of Karnataka and Tamil Nadu clashed over Mekedatu project, which supplies drinking water to Bengaluru.

What is the Mekedatu project?

- Mekedatu is a multipurpose balancing reservoir project at the confluence of the **River Cauvery and its tributary River Arkavathi.**
- The Mekedatu dam project is located in **Ramanagaram district** (about 100 km south of Bengaluru) close to where the Cauvery enters Tamil Nadu.
- The project has been contentious for years between the two states - **Tamilnadu and Karnataka.**
- The dam has a proposed capacity of 48 TMC (thousand million cubic) feet and an estimated cost of Rs 6,000 crore.
- The project aims to supply drinking water to Bengaluru and replenish the regional groundwater table.
- The Mekedatu dam will be larger than the **Krishnaraja Sagar project on the Cauvery.**



What is the issue around the project?

- Tamil Nadu witnessed widespread protests against the dam in 2015 as it would impact the flow of Cauvery river water to the state.
- The TN state Assembly passed unanimous resolutions against the project in December 2018 and January 2022.
- **2007 Tribunal verdict** - The Cauvery Water Dispute Tribunal (CWDT) in 2007 awarded Karnataka a share of 270 tmcft of Cauvery water.
- **2018 SC verdict** - The Supreme Court in 2018 delivered its **verdict** in the decades-old Cauvery water dispute, allocating more water to the state of Karnataka.
- Tamil Nadu will get 404.25 tmcft water per year, which will be 14.75 tmcft less than what was allotted by the tribunal in 2007.
- In 2021, Tamil Nadu approached the Supreme Court against the project and the key argument is that Karnataka is attempting to modify the flow of the river by constructing two reservoirs on it.
- Karnataka's action would impound the flow in the intermediate catchment below the Krishnaraja Sagar and Kabini reservoirs, and Billigundulu, along the border of Karnataka and Tamil Nadu.
- Tamilnadu's opposition claimed that under the **Inter-State River Water Disputes Act, 1956**, Karnataka is legally prohibited from obstructing or altering the natural course of a river.
- It also referred to the 2018 judgment, asserting that no irrigation project can start without the lower riparian states' consent.
- Tamilnadu even urged the Prime Minister to stop a feasibility study being conducted for the project in Karnataka that was cleared by the Central Water Commission (CWC) in 2018.
- The Karnataka government claimed that the project will not come in the way of releasing the stipulated quantum of water to Tamil Nadu, nor will it be used for irrigation purposes.

Cauvery Water Disputes Tribunal (CWDT)	
<ul style="list-style-type: none"> • Cauvery is an inter-State basin having its <u>origin Karnataka</u> and flowing through Tamil Nadu and Puducherry before out falling in Bay of Bengal. • The sharing of waters has been the source of a serious conflict between the two states of Tamil Nadu and Karnataka. • Government of India constituted the Cauvery Water Disputes Tribunal (CWDT) in <u>1990</u> in this regard. • Aims - To adjudicate the Cauvery water dispute and the river valley among the States of Tamil Nadu, Karnataka, Kerala and Puducherry. • CWDT gave its report and decision under the <u>Inter-State River Water Disputes Act (ISRWD) of 1956</u> in 2007. 	

4.5 Women in Judiciary

Women in Judiciary	
<ul style="list-style-type: none"> • Supreme Court - The apex court currently has only 3 women judges: Justices B V Nagarathna, Hima Kohli and Bela M Trivedi 	<ul style="list-style-type: none"> • High Courts - Out of 192 candidates recommended for the High Courts, only 37 were women.

<ul style="list-style-type: none">• The Supreme Court now has a working strength of 27 judges, against a sanctioned strength of 34 (including CJI) out of which only 3 are women.• Out of a total of 37 women candidates recommended by the Supreme Court Collegium for appointment as high court judges, only 17 were appointed so far.• Advocates - Supreme Court has till date, conferred the senior designation to over 488 advocates, and of which only 19 are women.	<ul style="list-style-type: none">• Women judges make up 9.5% of the total strength of high courts, according to Bar Council of India (BCI).• Sikkim High Court, with a total strength of just three judges, has the highest national average at 33.3% of women judges.• There is no woman chief justice at any high courts of the country.
<ul style="list-style-type: none">• District-level Courts - There are more women judges at the district court level than at the High Court level.• The India Justice Report (IJR) 2022 has revealed that the representation of women judges is steadily rising in subordinate courts, but in High Courts, the share of women judges remains low.• Goa with 70%, has the highest percentage of women judges at subordinate courts, followed by Meghalaya and Nagaland at 63% each.	

What are the positive impacts of having women in judiciary?

- The presence of women as judges and lawyers, will substantially improve the justice delivery system.
- Women judges bring diverse perspectives, experiences, and skills to the bench.
- They have nuanced understanding of the differing impacts that certain laws may have on men and women.
- Women in judiciary enriches the judicial process and contributing to better decision-making.
- Women's leadership in justice can enhance public trust and confidence, and make the court environment accessible to the marginalized.

What are the issues for women in judiciary?

- The legal profession still remains male dominated.
- Despite of acquiring sufficient skills and knowledge, women are severely under-represented in judiciary.
- There is no reservation of girls in legal education.
- The share of women judges remains uneven across States.
- Rajasthan and Uttar Pradesh have a very low proportion of women in legal aid.
- Caste-based reservations of judges at district-court level could not fully meet all its Scheduled Castes, Scheduled Tribes, and Other Backward Classes quotas.

What needs to be done?

- Horizontal reservation of women in higher judiciary similar to the one in few subordinate courts.
- More transparency in collegium system in appointment of judges especially women judges.
- Create awareness and mobilise political will among women.

4.6 16th Finance Commission

Why in news?

The Finance ministry is likely to initiate the process to set up 16th Finance Commission.

What is Finance Commission?

- It is a constitutional and autonomous body formed to give suggestions on centre-state financial relations.
- It was established by the President of India in 1951 under Article 280 of the Indian Constitution.
- The Commission is appointed every 5 years and consists of a chairman and 4 other members.

What is horizontal and vertical tax devolution?

- Article 280 mandates that each FC make recommendations about the distribution of net proceeds of taxes between the Union and states and among the states.

- **Vertical devolution** – The distribution of net proceeds of taxes between the Union and States.
- **Horizontal devolution** – The distribution of net proceeds among states.
- The FC has wide powers to redefine financial relations between and among the Union and states.

Role of Finance Commission	
Pre Reforms	Post Reforms
<ul style="list-style-type: none"> • In the pre-reform period, the Finance Commission recommendations were not that critical. • This is because the Centre had other ways to compensate States, or indeed to play favourites, through plan financing and public sector undertaking (PSU) investments. 	<ul style="list-style-type: none"> • Post reforms, fresh PSU investments have thinned out and the Planning Commission was abolished in 2014. • This virtually made the Finance Commission the sole architect of India's fiscal federalism. Its responsibility and influence are, therefore, much larger.

How should the 16th FC deal with?

- **Cesses and Surcharges** - The Centre is increasingly resorting to a levy of cesses and surcharges rather than raising taxes.
- The FC should also lay down guidelines for when cesses and surcharges might be levied, and suggest a formula to cap the amount that can be raised.
- **Freebies** - Another issue of focus for the 16th FC should be government spending on what has come to be called freebies.
- In a poor country, where millions of households struggle for basic human needs, it sounds cruel to argue against safety-nets for the poor.

What is the way forward?

- The restraints imposed by the Fiscal Responsibility and Budget Management (FRBM) Act should have acted as a check on populist spending.
- However, the governments have found ingenious ways of raising debt without it appearing in the budget.
- The next Finance Commission should focus the interest of long-term fiscal sustainability and lay down guidelines on the spending on freebies.

16th Finance Commission Issues

Tax pool

- Currently, the Centre gives away 41% of its tax pool to the States and the States will demand that this proportion be raised.

Borrowing Limit

- However, there is not much room for stretching this further, given the Centre's expenditure needs and the constraints on its borrowing limit.

Fiscal incapacity

- Historically, Finance Commissions have struggled to determine how much a State's deficit is due to its fiscal incapacity and how much is due to fiscal irresponsibility.

Distribution formula

- Tweaking the distribution formula to support deficit States without penalising responsible States is mathematically impossible task since it is not possible to give more to a State without giving less to another.

Inefficient & unfair

- The bottom-line think that it is in the very nature of horizontal distribution that richer States compensate poorer States.

5. GOVERNMENT POLICIES AND INTERVENTIONS

5.1 Prevention of Cruelty (Animal Birth Control) Rules, 2023

Why in news?

The growing population of street dogs has posed increasing challenges for municipalities and cities across the country.

What is the issue with stray dogs?

- Dogs have a unique relationship with man but recently strays act as a public health concern. There has been many incidents of stray dogs attacking children as well as adults.
- **Reasons -**
 1. Uncontrolled population of stray dogs.
 2. Becoming aggressive when they perceive a threat.
 3. Neglect, abuse or forcibly relocation.
 4. Illness, hunger, protection of litters.
 5. Territorial behaviour of dogs living as a community.
 6. Irresponsible ownership.

According to 2019 livestock census, India has nearly 1.5 crore stray dog population.

What does the new 2023 Prevention of Cruelty rules say?

- The Prevention of Cruelty (Animal Birth Control) Rules 2023 rules was notified by the central government under Prevention of Cruelty to Animal Act, 1960 and supersedes the Animal Birth Control (Dog) Rules, 2001.
- It provides guidelines on how to deal with the human and stray dog conflicts without relocating the dogs in an area.
- **Implementation** - The burden of ABC implementation will fall on the Animal Birth Control Monitoring Committees at the State, district and municipality levels.
- The Municipal Corporations need to implement the ABC and Anti Rabies Program jointly.
- The Programme needs to be carried out by Animal Welfare Board of India (AWBI) recognized organizations that are specifically recognised for Animal Birth Control programme.
- **Maintenance** - It is the duty of the local authorities to maintain and control the population of stray animals. They will be held responsible for any violation and animal-human conflicts.
- **Euthanasia** - The Rules also suggest euthanasia for 'incurably ill and mortally wounded dogs' as diagnosed and declared by the Local Animal Birth Control Monitoring Committee.
- It should be done in a humane manner by a qualified veterinarian.
- **Complaint Centre** - It also suggests establishment of an Animal Help Centre where complaints about dog or cat bites can be registered.
- **Feed Spots** - The Rules want the Resident Welfare Associations (RWAs) to designate feed spots for dogs which shall be least frequented by children and senior citizens.

Requirements for Smooth Functioning of New ABC Program Rules

- Updated infrastructure investments for the capture, housing, surgery and release of dogs.
- Specific processes to be recorded such as keeping and reporting.
- The procedures for responding to conflict situations.
- Engagement of organisations to ensure that the standards of ABC are high.
- Differentiation of street dogs from pet dogs to improve data collection and analysis.

5.2 Strengthening the ICDS Scheme

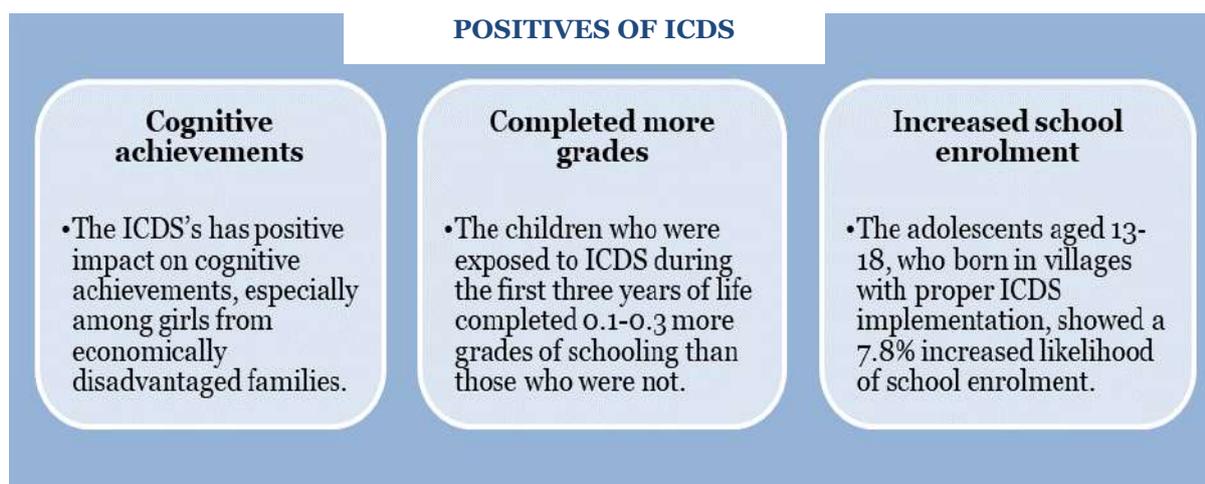
Why in news?

The high prevalence of stunting, wasting, and anaemia continues to pose public health risks for children and women.

What is the Integrated Child Development Service (ICDS) Scheme?

- Launched in 1975, it is one of the world's largest programmes providing an integrated package of services such as supplementary nutrition, immunization and pre-school education for the holistic development of a child.
- ICDS is a centrally sponsored scheme and is universal covering all the districts of the country.
- The ICDS targets children aged 0-6 years, pregnant women, and lactating mothers.
- It addresses non-formal pre-school education and breaks the cycle of malnutrition, morbidity, and mortality.

- The Scheme has been renamed as Anganwadi Services and the services are now offered as part of the [Saksham Anganwadi and Poshan 2.0](#).



What is the status of Anganwadi works in ICDS scheme?

- Even after 4 decades of relentless efforts, the ICDS still faces the herculean task of providing the nutritional and health outcomes for children aged 0-6 years.
- **Empower Anganwadi workers** – A significant first step towards fortifying the programme is to empower Anganwadi workers.
- Though the cornerstone of the ICDS, they are frequently stretched beyond their limits.
- As principal operatives in the Poshan 2.0 initiative, these workers bear the onus of advancing child nutrition, health, and education in their communities.
- **Roles** – It varies widely from employing modern technology, to practical tasks such as delivering health education, managing feeding programmes, and liaising with healthcare professionals.

Advantages of Empowering Anganwadi Workers
<ul style="list-style-type: none">• It would lead to better health and educational outcomes.• Double the net preschool instructional time, which led to improvements in math and language test score for children.• Children who remained enrolled also exhibited reduced rates of child stunting and severe malnutrition.• The cost of a nationwide roll-out of this model is relatively insignificant in comparison to the potential advantages it offers.• The new Anganwadi worker can be given the responsibility of concentrating only on preschool and early childhood education.• Apart from improving the well-being of rural communities, it would lead to the creation of 1.3 million new jobs for women across India.

What are the implications?

- The operationalisation of the [Saksham Anganwadi and Poshan 2.0](#) proposal hinges on its status as a Centrally Sponsored Scheme.
- **Scheme overseen** – State governments oversee its execution, including administration, management, and monitoring.
- **Recruitment** – Consequently, Anganwadi worker recruitment falls under their jurisdiction, guided by regulations and region-specific criteria.
- This decentralised approach promotes tailored, efficient implementation.
- The Government provides funds for Anganwadi workers' and helpers' honorariums on a cost-sharing basis.

What is the way forward?

- The urgent need for infrastructural improvement in India's Anganwadi centers cannot be overstated.
- The 2.5 lakh Anganwadi centres operate without functional sanitation facilities and 1.5 lakh centres lack access to potable water and approximately 4.15 lakh Anganwadi centers do not possess their own pucca building.
- To unlock the ICDS' full potential and address persistent issues, it is essential to revisit and re-evaluate its strategies and implementation.

6. GOVERNANCE

6.1 Central Vista Project

Why in news?

In the 75th year of Independence, India has a new Parliament building, built by Indians, and embodying the culture, pride and spirit of the entire nation.

What is the Central Vista Project?

- It is the project of revamping the Central Vista area from *Rashtrapati Bhavan to India Gate* with a budget outlay of Rs. 20,000 crore.
- The plan includes the construction of a new parliament, Prime Minister and Vice-President's residences along with 10 building blocks to accommodate all government ministries and departments.
- **Ministry** - *Ministry of Housing and Urban Affairs*. (Launched in 2019 & estimated to be completed by 2024)

Arguments favouring the Project	Arguments against the Project
<ul style="list-style-type: none"> • The existing Parliament House was commissioned in 1927 and showing signs of distress and over-utilization. • The existing Parliament is not able to meet the current requirements in terms of space and amenities. • Safety concerns - Current building is not designed according to fire norms. • Distressed infrastructure - Excessive repairs have worsened the condition of the building. • Inadequate workspace - The current parliament building poses a space constraint. • Narrow seating space - The seating halls are cramped and only the first two benches have the desk space to place documents and papers. • Obsolete communication structures - The communications infrastructure and technology is dated. • Vice President's House - Vice-President, Chairman of Rajya Sabha's house is in Maulana Azad Road away from the Central vista. • Prime Minister's House - Prime Minister's official residence is also outside the Central Vista in Lok Kalyan marg. • Decolonisation - The old structures in the Central Vista embodies the Colonial rule of India. • Ministries - Out of 51 ministries, 12 have offices outside the Central Vista which hinders coordination and synergy. 	<ul style="list-style-type: none"> • Healthcare - The Master Plan was conceived in September 2019, much earlier than the outbreak of COVID-19 pandemic. • Public Health has been a priority of the government and never compromised at the cost of the project. • Till date, only 2 projects of New Parliament Building and Redevelopment of Central Vista Avenue have been awarded fund. • Green Space - The overall green cover within Central Vista area will increase under the Master Plan. • No trees would be cut and the trees would also be transplanted to Eco-park. • Old Act - The Government Buildings Act, 1899 is in operation since 1899 and has not been repealed. • The CPWD has been awarded the role based on the Section 3 of the Act which exempts all Government Buildings from the regulation of municipal laws. • Public Space - Additional public and green spaces shall be added in Central Vista Avenue. • Places like the National Museum, Indira Gandhi National Centre for Arts, Central Vista Avenue and India Gate will be accessible to the public. • Heritage - None of the listed Heritage Buildings in Central Vista will be demolished further they will be retrofitted and refurbished for their future use.

What is the way ahead?

- India has grown out of its colonial past and the new Parliament building should be considered as a symbol of it.
- Still the heritage of the century old building must be preserved for its architectural marvel.
- The proximity of the ministry offices must aid and improve the synergy among the ministries.
- The technological features added to the Parliament should be put in good use to improve its efficiency.
- The resilient and safe buildings of Central Vista should be made and example of Indian Architectural heritage.

6.2 22nd Law Commission's Recommendation on Sedition

Why in news?

The 279th report of the Law Commission of India recommending the *retention of the sedition law*, has brought the 153-year-old colonial law to the centre stage yet again.

What is Section 124A of IPC?

- Section 124A of the Indian Penal Code (IPC) incorporated in 1870, describes the ***Law of Sedition***.
- The colonial law was derived from the British Sedition Act of 1661.
- It seeks to punish speech or writing that brings or tries to bring into hatred or contempt, or excites or tries to excite disaffection towards, the government established by law.

Landmark Cases on Sedition

- **Queen Empress Vs Bal Gangadhar Tilak (1897)**, Bombay Court - Defines sedition as disaffection which was interpreted as 'political hatred of government'.
- **Niharendu Dutt Majumdar and Ors. Vs Emperor (1942)**, Federal Court - The offence of sedition is committed only when there is incitement to violence or disorder.
- The Privy Council upheld Tilak's case and thus, sedition meant exciting or attempting to excite bad feelings towards the government.
- **Kedarnath vs State of Bihar (1962)**, Constitution Bench of the Supreme Court - Decided the constitutionality of sedition.
- The Court held that it is constitutionally valid for two reasons.
 - Sedition though an offence against the government, is against the state because the government is a visible symbol of state.
 - Article 19(2) imposes restrictions in the interest of the security of the state which has wider amplitude and includes the law on sedition.
- **S.G. Vombatkere vs Union of India (2022)** - The case challenged the constitutionality of the law of sedition.
- The Supreme Court had ordered a stay on all existing proceedings and also on the registration of fresh cases under sedition upon the Union Government.
- It assured the Court of a [review of the sedition law](#).
- The [Court's stay order](#) was in consideration of the fact that this law was widely misused by the law enforcement authorities.

What are the recommendations of the 22nd Law Commission?

- The law commission report has recommended the *retention of the highly debated Sedition law*.
- It broadly recommended three things:
 1. Widening the scope of sedition.
 2. Adding a higher quantum of punishment.
 3. Incorporating 'procedural safeguards' to prevent misuse.
- While Section 124A provides for a minimum imprisonment of 3 years, the commission recommends a minimum of 7 years in the name of national security.
- It clarified that in democratic India sedition laws would only be used against the 'tendency to incite violence or cause public disorder' and these provisions must be inserted in Section 124A.
- The commission defines tendency as a slight inclination and is decided by a policeman.
- Any alleged misuse of Section 124A of IPC should not be a reason to repeal the law and it should be reined in by laying down adequate procedural safeguards.

Why there is an uproar against the recommendation?

- The Commission recommends for the enhancement of punishment when there is a universal demand for the scrapping of this law.
- It attempts to bring sedition within the framework of reasonable restriction under Article 19(2).
- The law of sedition in Section 124A of the IPC is considered a colonial vestige and unconstitutional in a democratic country.
- The disaffection towards a government should not be an offence in a democratic republic where the people have the freedom to change a bad government.

6.3 Political Clearance

Why in news?

Delhi Education Minister who was invited by Cambridge University to speak at a conference, has been cleared by the Centre to travel to the UK.

What is political clearance?

- It is required for any government servant including public servants who is seeking to go abroad.
- The Ministry of External Affairs (MEA) issues political clearance.
- **Process** - The decision on political clearance is taken based on several factors, including
 - The nature of the event
 - Level of participation from other countries
 - Nature of the invitation
 - India's relations with the host country
- **Rejection** - The requests by CMs (and ministers) for political clearance can be denied based on above such factors by the MEA.
- **Issues** - MEA's sole right to decide on the suitability, desirability, and level of participation of Indian officials in engagements abroad.

The MEA issued an office memorandum that required Supreme Court and High Court judges to seek political permission for private visits abroad in 2021. The court quashed the office memorandum in 2022.

Who needs political clearance?

- **Public Servants** - All Chief Ministers and Ministers of states and Union Territories are required to obtain political clearance from the Centre before their travel abroad.
- **Judges** - For official visits, a judge of the Supreme Court or a state High Court has to obtain clearance from the Chief Justice of India.
- However, the personal travel of judges of the higher judiciary do not require such clearances.

Do government servants need any additional clearances?

- **Ministers** - Union ministers need clearance from the Prime Minister's Office in addition to the political clearance from the MEA for both official and personal trips.
- **Non-executive MPs** - Only for the *official trips*
 1. Members of Lok Sabha need clearance from the Speaker
 2. Rajya Sabha need clearance from the Chairperson (Vice President of India)
- **Bureaucrats** - For government employees, all foreign trips, official or personal, need approval.
- For officers up to the rank of Joint Secretary, clearance is given by the Minister concerned, after the MEA's political clearance.
- For officers above that rank, the proposal is approved by a screening committee of secretaries.
- **FCRA** - Rules for clearance vary according to the duration of the visit, the country being visited, and the number of members in the delegation.
- If the visiting Indian official is hosted by organisations other than those of the United Nations, Foreign Contribution Regulation Act (FCRA) clearance is needed from the Home Ministry.

6.4 CoWIN data leak

Why in news?

In one of the largest data breaches in India, data of several Indians vaccinated against Covid-19 was leaked on a Telegram bot.

What is the background of the issue?

- **eVIN** – India has been using a vaccine intelligence system called eVIN, which provides real-time feedback of vaccine stocks, power outages, temperature fluctuations etc.
- CoWIN is essentially an extension of eVIN and is a cloud-based IT solution for planning, implementation, monitoring, and evaluation of Covid-19 vaccination in India.
- It displays booking slots of COVID-19 vaccine available in the nearby areas and can be booked on the website.
- **Data leak** - It includes name, gender & birth details, as well as Aadhaar numbers, PAN cards, passport numbers, voter ids, and details of the vaccination centre in which a person was immunised.
- The data bot was offered by a Telegram channel called hak4learn, which frequently provides hacking tutorials.
- The Ministry of Electronics and Information Technology has not explicitly clarified whether or not the CoWIN database was breached recently or in the past.
- While the Ministry said that it has adequate security measures to protect CoWIN's database, at no point has it said the database itself has not been impacted.
- This only leaves the possibility that the Telegram bot was not scraping data from CoWIN in real time.

Personal Data	Non-Personal Data
<p>Personal data is any information that relates to an identified or identifiable living individual.</p> <p>Different pieces of information, which collected together can lead to the identification of a particular person, also constitute personal data.</p>	<p>In its most basic form, non-personal data is any set of data which does not contain personally identifiable information.</p> <p>This in essence means that no individual or living person can be identified by looking at such data</p>

National Data Governance policy has been finalised that will create a common framework of data storage, access and security standards across all of the government.

What is the Centre's defence?

- **Data access** – The Ministry of Health press release first lays out the three ways in which data on CoWIN can be accessed:
 1. A user can access their data on the portal through a onetime password (OTP) sent to their mobile number.
 2. A vaccinator can access data of a person, and the CoWIN system tracks and records each time an authorised user accesses the system.
 3. Third party applications that have been provided authorised access of CoWIN APIs can access personal level data of vaccinated people after OTP authentication.
- It claims that without an OTP, data cannot be shared with the Telegram bot.
- However, there is one API that has a feature of sharing the data by using just a mobile number.
- This API only accepts requests from a trusted API that has been whitelisted by the CoWIN system.
- Hence, there is no clarity on what this trusted API does and why it has been afforded the privilege of bypassing the entire OTP mechanism.

Indian Computer Emergency Response Team (CERT-In)

- CERT-In is the *nodal agency* for responding to computer security incidents as and when they occur.
- It issues alerts and advisories regarding latest cyber threats/vulnerabilities and countermeasures to protect computers and networks on an ongoing basis.
- It operates the *Cyber Swachhata Kendra* (Botnet Cleaning and Malware Analysis Centre) and works
 - To detect malicious programmes and free tools to remove the same.
 - To provide cyber security tips and best practices for citizens and organisations.

API stands for Application Programming Interface and it refers to any software with a distinct function.

What are the implications of the breach?

- The Health Ministry has asked [CERT-In](#) to look into this issue and submit a final report.
- The Ministry is yet to receive a final report on the incident from CERT-In on the issue.
- As such, it would be premature to disprove a breach until CERT-In explicitly states that in its report.

What is the way forward?

- The problem is that the level of awareness about this is very low and there is so much potential for misuse.
- There is a need for data protection law to prevent such data leaks.

6.5 Civil Services Conduct Rules

Why in news?

Being a civil servant comes with many perks and benefits, but it also brings with it its own limitations and various rules surrounding an officer's conduct.

All India Services	Central Civil Services
<ul style="list-style-type: none"> • The Indian Administrative Service, the Indian Police Service and the Indian Forest Service. • They are governed by Article 312 of the Constitution of India. • These services are selected by the central government with officers allotted to various state cadres. • The bureaucrats who work directly for the Centre are from each state on central deputation 	<ul style="list-style-type: none"> • Indian Foreign Service, the Indian Revenue Service, Customs and Central Excise Service and several others. • These services are under the central government itself with no state cadre system.

What are the rules for civil servants?

- Conduct rules for civil servants are the set of rules for the standards of behaviour of people working in the civil services.
- Civil servants are governed under
 - The All India Services (AIS) Conduct Rules, 1968
 - Central Civil Services (CCS) Conduct Rules, 1964
- These rules were framed based on recommendations of the [Committee on Prevention of Corruption](#), headed by [K.Sanathanam](#).

Civil servants are recruited by Union Public Service Commission (UPSC)

What are the restrictions for civil servants under these rules?

- **Vague** - The Conduct Rules cover a wide range of issues, some rules are vague and some rules are more specific.
- Rule 3(1) states 'shall do nothing which is [unbecoming of a member of the Service](#)' and gives the ambiguous idea of personal integrity.
- **Political neutrality** - Rule 5(1) states civil servants are not allowed to be part of or assist political parties.
- While members can hold personal political beliefs, these rules restrict the degree to which they can act on them.
- **Personal opinion** - Expressing personal opinions also has similar restrictions.
- Rule 7 of AIS Rules restricts expressing personal opinion over public media in any form which has adverse criticism on government activities is restricted.
- **Dowry** - Both giving and receiving dowry is strictly prohibited under rule 11 (1-A) of the AIS Rules on 'Giving or taking of dowry'.
- **Gifts** - Rule 11(1) deals with the receiving of gifts under certain conditions.
- Any gift whose value exceeds Rs.25, 000 by a civil servant needs to be reported to the Government.

What are the newly added rules?

- In 1979, the government added that, 'The direction of the official superior shall ordinarily be in writing.'

- In 1998, the government added that ‘No member of the Service shall employ to work any child below the age of 14 years.’
- In 2014, few sub-rules were added to the Conduct Rules.
- Every member of the Service shall maintain -
 1. High ethical standards; Political neutrality
 2. Integrity and honesty; Accountability and transparency
 3. Responsiveness to the public; Courtesy and good behaviour with the public.
- The threshold of Rs 25,000 for receiving gifts was last fixed in 2015.

How about the coverage of the rules and the penalty?

- **Coverage** - Officers are covered under the rules as soon they join training and certain rules continue to apply post retirement as well.
- **Penalty** - Failing to comply by the rules invite penalties and transgressions can attract two kinds of penalties - major and minor and major penalties can include ‘dismissal’ from the service as well.

6.6 Challenges for Forest Policing in India

Why in news?

Poachers gunned down a forester who was part of a six-member patrolling team in Odisha’s Simlipal tiger reserve.

According to International Rangers’ Federation (IRF), 162 foresters lost their life in India while on duty which is the highest in the world and accounts for as high as 31% of the total ranger deaths across the world.

What is the duty of foresters?

- Forest officers are public servants who administrates and govern the forests across the territory of India based on the respective States’ laws.
- The duties and responsibilities of forest officers are provided under the **Indian Forest Act, 1927**.
- Forest staff’s job is to protect scarce and lucrative resources like endangered animals, trees, sand and boulders, minerals, and forest land.
- India’s frontline forest staff like contract labourers, guards, foresters and rangers fight against poachers, illegal miners, and tree-fellers.
- They also exercise the powers bestowed upon them under the following acts -
 1. Indian Forest Act of 1927
 2. Forest Conservation Act of 1980
 3. Wildlife Protection Act of 1972

Can forest frontline staffs be armed?

- **Arms** - In India, some state forest departments issue firearms to field staff.
- They may be issued weapons from basic .303s to INSAS rifles and SLRs, a range that includes 12-bore shotguns, 0.32- and 0.22-calibre revolvers, etc. depending on the state the serve.
- **Power to use** - Forest officials have no power to proactively use their weapons.
- They can only exercise their right of private defence under **Sections 96 to 106 of the Indian Penal Code**, like any other citizen.

Issues faced by forest staffs

Illegal forest exploits

- Frontline forest staff fight against varied issues such as illegal timber transit, illegal mining and quarrying, illegal sawmills, hunting, etc.

Prohibition of arms

- Uncertain law and order situations often prevent forest guards from carrying these weapons, particularly in insurgency-hit areas.

Consequence of arms usage

- Foresters do not have the same legal protections as police officers for using their weapons in the line of duty.

Flipside of arms

- There is potential for abuse of such powers (legal protection same as police).

Bad optics

- The frontline forest staff are the most visible arm of the state to the forest-living communities.

Lack of training

- Forest staffs sometimes lose their life not because they did not have guns but they do not know how to fire their weapons.

- The onus to justify the use of firearms would be on the forest official in an inquiry.

What needs to be done for the protection of forest staffs?

- The State Forest Service Officers Association (SFSOA) of Telangana in representation submitted listed few demands to protect foresters.
- **Arms** - The provision of pistols to Forest Range Officers (FRO) rank and above and rifles to field-staff for self-protection.
- **Legal protection** - While guns and legal protection may be useful in self-defence, what foresters need is to be empowered to do their job.
- **Forest Stations** - Establishment of forest stations at the Division Level with required staff and infrastructure especially in vulnerable areas (Kerala Forest Department is having such stations)
- Each station should be headed by a FRO rank officer and supported by sufficient personnel.
- **Appointments** - Too many vacancies of frontline workers across India needs to be filled.
- Allocation of more vehicles for effective patrolling in the core areas.

7. HEALTH

7.1 The Next Pandemic

Why in news?

The WHO Director-general at the 76th world health assembly has cautioned against the threat of emerging pathogens.

What is a pandemic?

- A pandemic is a disease outbreak that spreads across countries or continents.
- COVID-19 is one such pandemic in recent years, which led to waves of infections and deaths in all countries.
- The World Health Organisation (WHO) declared that COVID-19 was no longer a [Public Health Emergency of International Concern](#).

How do pandemics happen?

- **Air travel** - Ease of travel makes it likely for infections to spread to a large number of countries.
- **Urbanisation** - Large number of people living in close proximity. Travel and density of population has played a role in previous pandemics as well.
 - The Spanish Flu of 1918 spread through congested and overcrowded camps.
 - Black Death is also thought to have come to Europe with rats that were aboard trading ships.

How has climate change impacted outbreaks and pandemics?

- Deforestation and encroachment of habitats of other animals has brought the humans and animals closer and increased human-animal interactions has led to more zoonotic transfer of diseases.
- The climate itself may change the habitats of the disease-carrying vectors.
 - For example: The geographical range of dengue in the country expanded to hilly and colder regions.
- Climate change leads to extreme weather events that displace people and force them to live in poor hygienic conditions.
- It may also increase the risk of '[viral spillover](#)' in some regions that could cause new pandemics.

WHO Blueprint priority disease	Fatality rate	Recent outbreaks
CCHF	10%–40% ³⁸	Pakistan, 2010. ³⁹
Filoviruses (Ebola and Marburg)	24%–90%	West Africa, 2013–2016 and DRC 2017 and 2018 (Ebola). Uganda and Kenya, 2017 (Marburg).
Lassa fever	1–15% ⁴³	Annual recurring outbreaks in West Africa. ⁴⁴
MERS-CoV	~35%	Saudi Arabia, 2013–2018. South Korea, 2015.
SARS	~10% ⁴⁷	Global, 2003. ⁴⁷
Nipah and henipaviral diseases	~30%	Bangladesh, 2004. India, 2018. ⁵⁰
Rift Valley fever	<1% ⁵¹	Republic of Niger, 2016. ⁵¹
Zika virus disease	Not fatal	South and North America, 2015–2016.
Disease X		

What are pandemic potential pathogens?

- **Pandemic potential pathogens** - The microorganisms that are highly transmissible capable of spreading unchecked amongst humans and highly virulent capable of causing severe disease and death.
 - Coronaviruses are one such pathogens that has pandemic potential.
- **Priority List** - The WHO has a priority list of pathogens that are pandemic potential and don't have adequate drugs and vaccines against them.
- The list helps in prioritising research for developing diagnostics, drugs, and vaccines for these diseases.
- The list includes '[Disease X](#)' which represents a serious international epidemic could be caused by a pathogen currently unknown to cause human disease.

What is the way forward?

- A one-health surveillance can track outbreaks in both human and animal population.
- Recently, the WHO has launched the [International Pathogen Surveillance Network](#) (IPSN).
- There is a need to keep the health systems ready for a health emergency including systems to quickly come up with diagnostics, drugs, or vaccines.

7.2 Issues with Male Centric Medicine

Why in news?

It is time for policy intervention in the space of gender-specific research in medicine, with India's G-20 presidency an ideal time to highlight this issue.

What is the background of the issue?

- 3 decades ago, the U.S. National Institutes of Health (NIH) Revitalization Act of 1993 mandated the inclusion of women and minorities in clinical trials in a bid to reduce health disparities.
- Yet, to date, the male model of medicine is thriving, and so is the tendency of treating women as smaller men despite a growing body of research insisting on physiological differences between the sexes.

Status of Generic Drugs and Trials across the Globe

India	Australia
<ul style="list-style-type: none">• In India, the gender disparity in clinical trials has even bigger implications because of generic drug production and consumption.• It has been demonstrated in various studies that women's bodies respond differently to the components of generic drugs.	<ul style="list-style-type: none">• The country recently included women in clinical trials for generic medicine.• Women have been either overdosing, as in the case of Zolpidem, a common sleep medicine, or not getting enough, as in the case of several pain medicines.

What is the status of mental health?

- It is not just about treatment but also testing and diagnosis where women have been getting a rough deal.
 - For instance, in Tamil Nadu, 26% of men and 31% of women aged 61-70 have symptoms indicating a high likelihood of depression.
- Pregnant women are further down the ladder of representation in clinical trials and research.
- The depression rates and the prevalence of anxiety are higher for women than for men worldwide in general.
- Women with an early onset of depression are less likely to obtain college degrees and less likely to pursue postgraduate degrees leading to the vicious cycle of women's under-representation in various fields.
- Like depression, cardiac issues are now acknowledged as having a slightly more prevalence in women yet they are treated lesser than men.

World Health Organization data from 2017 show that every day about 808 women die due to complications of pregnancy & childbirth.

- Various studies demonstrate that women are less likely to receive appropriate medications, diagnostic tests and clinical procedures even in developed countries such as Canada and Sweden.

What are the gaps that can be linked to lack of female centric medical research?

- The exclusion of women from clinical trials for critical illnesses such as cancer and heart disease has resulted in a limited understanding of sex-specific symptoms and responses to illnesses such as breast cancers, polycystic ovarian syndrome, and pregnancy-related issues.
- Recent studies show that the funding received for research in migraine, endometriosis and anxiety disorders is much lower in proportion to the burden of these illnesses.

What can India do?

- India has several progressive policies with respect to women’s health including the right to abortion.
- It is time for policy intervention in the space of sex-specific research in medicine and the implementation of outcomes.
- India’s G-20 presidency may be an opportune time to highlight this issue in alignment with Sustainable Development Goals on women’s health.
- In an equitable world, women would be accepted as an individual category, with race, age and class as subcategories.

8. BILATERAL ISSUES

8.1 Key takeaways from PM Modi’s U.S. Visit

Why in news?

Prime Minister Narendra Modi had a three-day state visit to the United States adding momentum to the India-USA bilateral relationship.

How significant is the State visit?

- Prime Minister Narendra Modi's 3-day state visit to the US highlights the country's dual identity as a ***spiritual democracy*** and an ***economic power***.
- The visit showcased India's cultural heritage, diplomatic prowess, and its growing influence on the world stage.
- The bilateral meeting brought out several strategic outcomes for India ranging from emerging technologies, space, energy and defence.

What are the key takeaways from PM’s U.S. visit?

- **Semiconductor Supply Chains** - A MoU on Semiconductor Supply Chain and Innovation Partnership was signed between the countries.
- **Critical Minerals** - India became the newest partner of the U.S.’s [Minerals Security Partnership](#) (MSP) to diversify and secure critical mineral supply chains.
- **Telecommunications** - India and the United States launched public-private Joint Task Forces.
- India’s [Bharat 6G](#) and the U.S. Next G Alliance will co-lead this public-private research.
- **Space** - India has signed the Artemis Accords, a common vision of space exploration for the benefit of all humankind. To know more about this, [Click here](#).
- **Quantum tech** - A Joint Quantum Coordination Mechanism was established to facilitate joint research between the public and private sectors across both countries.



INDIA - US TIES	
STRATEGIC PARTNERSHIP ACROSS SECTORS	
TECHNOLOGY	TRADE
▶ The Indo-US Quantum Coordination Mechanism	▶ Mutual resolution of six WTO trade disputes
▶ A \$2-million grant programme for joint development of AI	▶ India now part of the Minerals Security Partnership
▶ Jointly funded research projects on cybersecurity	SPACE
DEFENCE	▶ Nasa, Isro to develop strategic framework for human spaceflight by the end of 2023
▶ Adoption of the Defense Industrial Cooperation Roadmap	IMMIGRATION
▶ A defence acceleration platform for joint tech innovation	▶ New US consulates in Bengaluru and Ahmedabad; an Indian consulate in Seattle
ENERGY TRANSITION	AVIATION
▶ An India-US multibillion-dollar investment fund for green tech	▶ Boeing to invest \$100 mn to train 31,000 pilots in India in 20 years
▶ India to co-lead multilateral Hydrogen Breakthrough Agenda to boost availability of low-carbon hydrogen globally	

- **iCET** - ‘*Innovation Handshake*’, a commercial Dialogue will be launched to connect each country’s start-up ecosystems, supporting U.S.-India Initiative on Critical and Emerging Technology ([iCET](#)).
- **Civil Aviation** - Air India strike a historic agreement with Boeing to acquire more than 200 American-made aircraft.
- **Defence** - The India-U.S. Defence Acceleration Ecosystem (INDUS-X) was inaugurated joint innovation on defense technologies integrating India’s private defense industry.
- **Student Exchange** - Launched a new Joint Task Force of the Association of American Universities and leading Indian educational institutions, including the Indian Institutes of Technology.
- **Research** - Launched a university network of Indo-U.S. Global Challenge Institutes to help create more research partnerships and exchanges in agriculture, energy, health, and technology.
- **Energy** - USAID signed an MOU with the Ministry of Railways to work together on Indian Railways’ target to become a “net-zero” carbon emitter by 2030.
- India and the United States committed to creating innovative investment platforms for Green Technology.
- **Medicine** - The U.S. National Cancer Institute through two new grants to develop an artificial-intelligence (AI)-enabled digital pathology platform.

How is India’s strategic independence and geopolitical balance?

- The US is to join the Indo-Pacific Oceans Initiative inaugurated by Indian PM.
- The US and India will hold an Indian Ocean Dialogue to promote greater regional coordination.
- The United States promised its support for India in several international forums like
 1. Reiterates permanent membership in a reformed UNSC,
 2. Has announced support for Indian membership in the International Energy Agency (IAEA)
 3. Re-commits to advancing Indian membership in the Nuclear Suppliers Group (NSG)
- Also, President Biden has invited Prime Minister Modi to attend the APEC Summit in San Francisco in November 2023.

8.2 India’s Jet Engine Deal with the U.S.

Why in news?

A landmark agreement to facilitate the transfer of at least 11 critical jet engine technologies was signed between India and the U.S.

What is the background of the issue?

- **GEA & HAL** – The deal will allow American manufacturing company General Electric (GE) Aerospace to share critical technology with Hindustan Aeronautics Limited (HAL).
- **Tejas Mk-II** – The deal will felicitate for the joint production of GE-F414 jet engines that will power indigenous Light Combat Aircraft (LCA) Tejas Mk-II.
- The proposed agreement has evoked considerable interest in India and beyond.
- Experts have termed it a significant step for bilateral defence and high-tech cooperation amid China’s growing influence and global technological dominance.

What will the deal include?

- **Co-production of F414** – While there has been no official confirmation yet, senior officials have hinted at a possible collaboration on the co-production of F414 jet engines.

India’s quest for indigenous aero-engines

- **HF-24 Marut** – The quest began in the 1960s with the country’s first indigenous fighter, HF-24 Marut.
- **Kaveri programme** – A few decades later, India sanctioned the Kaveri programme to develop an indigenous military gas turbine engine for the ambitious LCA project.
- **F414 engines** – In 2010, the Aeronautical Development Agency (ADA) selected the more powerful variant, F414 engines, to power Tejas Mark-2.
- **GE-HAL deal** – A new framework pushed by PM Modi and President Joe Biden last year put the focus back on the GE-HAL deal.

- **Tech transfer** – Media reports claim that the U.S. has agreed to transfer around 80% transfer of the tech value to India.
- **Know-how to a non-ally** – This is unprecedented considering that America maintains strict controls over domestic military technology and has never handed over such critical technological know-how to a non-ally in the past.
- The agreement will require final approval from the U.S. Congress before it is inked by the two leaders.

What are the features of the F414 engine?

- **F414-INS6** – India has shortlisted the F414-INS6 model for LCA Mk-II for the IAF, and the export market in the future.
- An advanced and more efficient version of the F404 engines conceived in the early '90s, F414 engines currently power the LCA Tejas.
- **Specifications** – The engine's main specifications are:
 1. An afterburner turbofan 154-inch long engine in the 22,000-pound (98 kilo newtons) thrust class, 35% more thrust than the F404 engines.
 2. A thrust-to-weight ratio of 9:1, which is an indicator of aircraft propulsion.
 3. Has low maintenance costs and boasts of unrestricted engine performance on demand with more than five million engine flight hours.
 4. The engine is designed to maximise time on wings, which is a measure of the operational reliability of an engine.

How crucial is the deal for India?

- **5th Country** – India will become the 5th country in the world to produce jet engines once the deal is sealed, joining the U.S., Russia, France and the U.K.
- **Russia-Ukraine conflict** – It helps India in boosting its military capabilities and growing defence manufacturing at a time when the world is reeling due to the impact of the Russia-Ukraine conflict.
- **Ageing Russian fighters** – The agreement will help replace the fleet of ageing Russian fighters.
- **Powerful engines** – The deal would bolster India's capacity to field indigenously produced fighters with powerful and reliable engines, saving decades of research and development costs.

What is the way forward?

- Expanding the type and sophistication of the arms the U.S. is willing to sell to India may elevate the U.S. as an alternative to India's traditional dependence on Russian hardware.
- This is particularly important, amid rising concerns about Russia's strategic embrace of China.
- Also there is a growing questions about the quality, reliability, and capacity of a Russian defence industrial base increasingly strained by the Ukraine conflict.

8.3 India's role in UN Peacekeeping Missions

Why in news?

There is a need to invest more in technology and resources for the safety of United Nations (UN) Peacekeepers deployed in conflict-torn regions.

What is UN peacekeeping?

- **UNDPO** – The UN Peacekeeping, governed by the *Department of Peace Operations (UNDPO)*, assists countries tormented by conflict in their journey towards sustained peace.
- It follows 3 fundamental principles: consent of the parties, impartiality, and refraining from the use of force, except in self-defence.
- Since 1948, UN Peacekeepers have undertaken 71 Field Missions.
- There are approximately 81,820 personnel serving on 13 peace operations led by UNDPO, in four continents currently.
- A total of 119 countries have contributed military and police personnel to UN peacekeeping.

- **Role of UN peacekeepers** - They protect civilians, actively prevent conflict, reduce violence, strengthen security and empower national authorities to assume these responsibilities.
- This requires a coherent security and peacebuilding strategy that supports the political strategy.
- UN peacekeeping helps host countries to become more resilient to conflict, laying the groundwork to sustain long-term peace, including by addressing root causes of conflict.

What is India's contribution to UN Peacekeeping?

India was the first country to contribute to the Trust Fund on sexual exploitation and abuse, which was set up in 2016.

- India has a long history of service in UN Peacekeeping, having contributed more personnel than any other country. It has also provided, and continues to provide, eminent Force Commanders for UN Missions.
- **TCC** – India is the *fifth largest troop contributor (TCC)* with 5,323 personnel deployed in 8 out of 13 active UN Peacekeeping Missions, of which 166 are police personnel.
- **Highest fatalities** – India also holds the unfortunate record of having the highest fatalities due to malicious acts, during UN peacekeeping missions.
- A total 175 Indian peacekeepers have so far died while serving with the United Nations.
- India has lost more peacekeepers than any other UN Member State.
- **Medical camps** – Medical care is among the many services Indian Peacekeepers provide to the communities in which they serve on behalf of the Organization.
- **Veterinary support** – They also perform specialised tasks such as veterinary support and engineering services.

Incidents of India's participation in UN Peacekeeping missions

Korea	Middle East	East Asia
<ul style="list-style-type: none"> • India's mediatory role in resolving the stalemate over prisoners of war in Korea led to the signing of the armistice that ended the Korean War. 	<ul style="list-style-type: none"> • The UN entrusted the Indian armed forces with subsequent peace missions in the Middle East, Cyprus, and the Congo. 	<ul style="list-style-type: none"> • India also served as Chair of the 3 international commissions for supervision and control for Vietnam, Cambodia, and Laos established by the 1954 Geneva Accords on Indochina.

What is the role of women in Indian Peacekeeping?

- India has been sending women personnel on UN Peacekeeping Missions. In 2007, India became the *first country to deploy an all-women contingent* to a UN Peacekeeping Mission.
- The Formed Police Unit in Liberia provided 24-hour guard duty and conducted night patrols in the capital Monrovia, and helped to build the capacity of the Liberian police.
- These women officers not only played a role in restoring security in the West African nation but also contributed to an increase in the number of women in Liberia's security sector.

Are Indian efforts recognised?

- The Indian contingent in the Upper Nile region have all received UN Medals of Honour.
- India had the honour of providing two Military Advisers, one Female Police Adviser, and one Deputy Military Adviser to the Secretary General of the United Nations.
- **Need of the hour** - There should be greater financial and human resources for peace-building in post-conflict societies, where UNPKOs have been mandated, according to officials.
- India is of the view that the international community must grasp the rapid changes that are underway in the nature and role of contemporary peacekeeping operations.
- The Security Council's mandates to UN Peacekeeping operations need to be rooted in ground realities, and co-related with the resources provided for the peacekeeping operation.

8.4 India - Nepal Relations

Why in news?

Nepal PM Pushpa Kamal Dahal 'Prachanda' had an official 4 day visit to India to strengthen India-Nepal ties.

What is the history of visits from PMs of both India and Nepal?

- Regular reciprocal visits by heads of state/government had been a bilateral tradition between India and Nepal until 1997. After 1997 India continued to host Nepali leaders, but did not make reciprocal visits.
- **Indian PM's visit** - Prime Minister Modi had invoked '*neighbourhood first*' to denote a new beginning in relations, during his visit to Nepal in 2014.
- **Nepal PM's visit** - Nepal's Prime Minister Prachanda earlier visited India twice in 2008 and 2016, the visit in 2023 is his third official visit to India.
- The visit in 2023 has delivered many more concrete outcomes than the previous visits and visit marks a more positive and hopeful turn in India-Nepal relations.

How is India-Nepal relationship in the present time?

- **Hydropower cooperation** - Till a decade ago, Nepal was dependent on electricity imports from India.
- Now, Nepal has an installed capacity of 2,200 MW, and in season, can export power to India. (452 MW imported to India in 2022)
- In the lean season, Nepal does import power from India but its dependence has dropped from 20% to 10% during the last five years.
- **Power Trade** - Targeting the export of 10,000 MW within a 10-year time frame, a long-term power trade agreement has been finalised.
- The 900 MW Arun III project started in 2018 by the SJVN (formerly the Satluj Jal Vidyut Nigam) will be operational later in 2023.
- A memorandum of understanding (MoU) for the 695 MW Arun IV project was signed in 2022.
- **New Deals** - The two sides signed deals to have Indian Public Sector Undertakings, National Hydro-Power Corporation and Satluj Jal Nigam respectively.
- **Sub-regional cooperation** - India has agreed to the Nepali demand for the facility to export electricity to Bangladesh using the Indian grid.
- **Connectivity** - In 2014 Nepal visit by Prime Minister Modi, to highlight the focus on connectivity, he coined the acronym *HIT*, covering *Highways, Info ways, and Trans ways*.
- In 2015 the relations took a downturn with the economic blockade.
- **Check posts** - The Rupaidiha-Nepalgunj Integrated Check Post was inaugurated to facilitate the movement of goods and people.
- The work begun on the Sunauli-Bhairahawa integrated check post and a MoU was signed for another check post at Dodhara Chandni.
- **Railways** - The Jaynagar-Kurtha railway line was inaugurated last year and there are plans to extend them.
- **Petroleum Pipeline** - The [Motihari-Amlekhgunj](#) petroleum pipeline between India and Nepal became operational in 2019 and work has begun to extend it to Chitwan.
- A MoU was signed for a new pipeline between *Jhapa and Siliguri*, which includes terminals and other infrastructure.

India – Nepal Relations

- India share an open border with Nepal that allows their nationals to move freely.
- **Economic ties** - India remains a major trade and transit partner, where a number of Nepalese continue to earn a living or pursue higher education.
- **Security ties** - India address security and geopolitical issues in its neighbourhood more smoothly.
- **Political ties** - In the near past, has gone through more ebbs than flows, largely due to a border dispute over the Kalapani area.

To know more about India-Nepal relations, [Click here](#)

Points of contention between India and Nepal

Treaty of Peace and Friendship	Kalapani boundary	Gurkha army recruitments
<ul style="list-style-type: none"> • In Nepal, conviction has taken root that the 1950 India-Nepal Treaty is unfair as it was imposed somehow. 	<ul style="list-style-type: none"> • A constitutional amendment was pushed through in Nepal due to 	<ul style="list-style-type: none"> • The practice of recruiting Gurkha soldiers into The Indian Army's

<ul style="list-style-type: none"> The <i>India-Nepal Treaty of Peace and Friendship of 1950</i> was signed in the backdrop of the Maoist revolution in China and the subsequent takeover of Tibet. The 1950 Treaty, in large measure, reflects the provisions of the 1923 Treaty between Nepal and British India. The demand to review the Treaty was officially raised first in 1995 and in 1996. It was on the agenda of the Foreign Secretary's meeting but substantive talks have not taken place. 	<p>internal political turmoil.</p> <ul style="list-style-type: none"> This led to the change in Nepal's map unilaterally and Kalapani boundary was raised as a national issue. Notably, India has still not welcomed Nepal's constitution, promulgated in 2015. 	<p>Gurkha regiment began in 1816 by the British Indian Army.</p> <ul style="list-style-type: none"> This was continued under a 1947 treaty based on 'equal treatment'. The Agni path scheme impacts the recruitment of Gurkha soldiers into the Indian Army's Gurkha regiments. The Agni path revision of the terms needs to be discussed between the two armies and the defence and finance officials concerned. The Nepali demand is that the Gurkha recruits from Nepal be exempted from the four-year tenure laid down under the scheme.
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9. INTERNATIONAL ISSUES

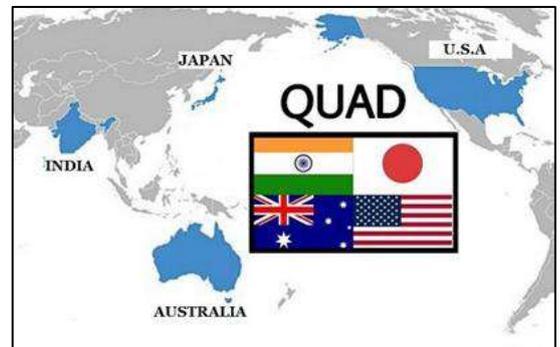
9.1 QUAD Leaders' Summit 2023

Why in news?

Prime Minister of India participated in the third in-person Quad Leaders' Summit in Hiroshima, Japan held in 2023.

What is QUAD?

- The **Quadrilateral Group** consisting of *India, Australia, Japan and the U.S.* was formed in *2017*.
- It aims to strengthen the defence and security cooperation amongst the four countries.
- It was proposed by the former Japan's Prime Minister, Shinzo Abe in 2007 to check China's growing influence and assertiveness in the Indo-Pacific region.
- It has a shared objective to ensure and support a "free, open and prosperous" Indo-Pacific region.



What happened in QUAD 2023 Summit?

- The Leaders of the QUAD countries participated in person in the Summit held at **Tokyo, Japan**.
- The Summit demonstrated the QUAD'S solidarity and commitment to the common vision of Free, Open, and Inclusive Indo-Pacific (FOIP) and an international order based on the rule of law.
- A joint statement on all important issues discussed at the Summit was issued.
- Announced six initiatives to strengthen the resilience and prosperity of the Indo-Pacific region.

What are the outcomes of Tokyo QUAD Summit?

- The initiatives announced in the Summit complements the development priorities of the Indo-pacific region.
- Clean Energy Supply Chains Initiative** to facilitate research and development and support the Indo-Pacific's energy transition.
- The *Quad Principles of Clean Energy Supply Chains* were approved to guide engagement with the region on clean energy supply chain development.
- 'Quad Infrastructure Fellowships Programme'** to support policy makers and practitioners in the region to design, build and manage sustainable and viable infrastructure in their countries.
- 'Partnership for Cable Connectivity and Resilience'** to leverage QUAD'S collective expertise in undersea cables to secure and diversify these critical networks.

- QUAD support for a small-scale ORAN deployment in Palau, the first in the Pacific region.
- They also released the ORAN Security Report to support industry investment in open, interoperable and secure telecom platforms.
- **QUAD Investors' Network (QUIN)** has been launched as a private sector led platform to facilitate investments in strategic technologies.
- The **Indo-Pacific Partnership for Maritime Domain Awareness**, announced at 2022 Summit had notable progress.

What are the concerns expressed in 2023 summit?

- **Russia-Ukraine war** - In a joint statement the QUAD countries express their deep concern over the Ukraine war, however, in the joint statement, they did not condemn or criticise Russia for its invasion of Ukraine.
- **Stand of Countries** - India has so far refrained from condemning or criticising Russia for its invasion while other 3 countries have regularly condemned Russia.
- With strong ties with Russia in defence and energy, India had earlier resisted any strong language in Quad joint statements.
- **Consistency** - All the 4 countries stood for adherence to international law, respect for territorial integrity and UN principles.
- The quad particularly emphasised the UN Convention on the Law of the Sea (UNCLOS), and the maintenance of freedom of navigation and overflight, especially in the East and South China Seas.
- **Implicit reference to China** - The statement did not mention China by name but gave implicit reference to China for its dominance in Indo-Pacific.
- The 4 countries strongly opposed destabilising or unilateral actions that seek to change the status quo by force or coercion in the Indo-Pacific region.
- **Indo-Pacific** - The Quad asserted and called for peace and stability in the Indo-Pacific where no country dominates and no country is dominated.
- **Anti-terrorism** - The Quad strongly condemned the acts of terrorism including the 26/11 attacks in Mumbai and Pathankot.

Future Ideas and Actions of QUAD
<ul style="list-style-type: none">• Shared Values - Through shared efforts, the QUAD countries are giving a practical dimension to their vision for a free, open, and inclusive Indo-Pacific.• Designation of terrorists - The countries stressed their commitment to pursuing designations of terrorists, as appropriated by the <u>UNSC 1267 Sanctions Committee</u>.• Continuation - Ensuring that the Quad will continue to support access to quality, sustainable and climate-resilient infrastructure investments in the region as indicated at the 2022 Quad Leaders' Summit.

9.2 The Summit for a New Global Financing Pact

Why in news?

The Summit for a 'New Global Financing Pact' was held in Paris, France to discuss the repercussions of the climate, energy, health and economic crises, particularly in the most vulnerable countries and its financing.

What is the Pact Summit about?

- **Genesis** - The Summit for a New Global Financing Pact was announced at the 27th Conference of Parties (COP27) to the United Nations Framework Convention on Climate Change (UNFCCC).
- The Summit for a New Global Financing Pact is also known as '**Pact Summit**' in short.
- The summit was spearheaded by the French President Emmanuel Macron highlighting the need for a new financial pact with the most vulnerable countries.
- The summit was precipitated as a follow-up to the Bridgetown Initiative tabled by Barbados.
- **Pact Summit** - It is an attempt to collectively rethink the global financial architecture of international solidarity and climate action by proposing concrete solutions to create a fairer, more effective and more responsive global financial system.

<p>Bridgetown Initiative - A package of proposals to get more money flowing from developed to developing countries for climate & development.</p>
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What is the need for such summit?

- Poor and vulnerable countries battle ‘a *cocktail of interconnected crises*’ such as poverty, debt, inflation triggered due to the Russia-Ukraine conflict, and increasing climate impacts.
- Countries of Global South are in a debt crisis.
- Developing countries are facing pressure to decarbonise their economies without adequate climate finance flowing in.
- African countries are facing an unprecedented funding squeeze.

What happened at the Summit?

- The Summit took on the monumental task of addressing the lack of money flowing to poor and vulnerable countries. It convened 4 Working Groups on the following topics prior to the summit:
 1. Ensuring more fiscal space for the most-affected countries.
 2. Financing the private sector in low-income economies.
 3. Increasing investment in green infrastructures in emerging and developing markets.
 4. Developing innovative solutions to provide additional resources in support of countries vulnerable to climate change.

A third of developing countries and two thirds of low-income countries face high risks of excessive debt.

What was announced at the summit?

- **Multilateral Development Banks (MDBs)** - A contentious MDB Vision Statement document did not get full consensus.
- An additional lending capacity of \$200 billion would be unlocked by MDBs for emerging economies.
- **World Bank** - It announced *disaster clauses* for debt deals to suspend debt payment in the case of extreme weather events as advocated by Bridgetown Agenda.
- It also unveiled a ‘*Private Sector Investment Lab*’ with the aim to develop and rapidly scale solutions that address the barriers in private sector investments.
- **Special Drawing Rights** - The ‘*recycling*’ of SDRs from rich countries to poor countries or MDBs, has been proposed as means to expand the amount of concessional finance to developing countries.
- **A new JETP** - A new 2.5 billion Euro JETP deal was announced for Senegal, with a consortium of countries comprising of Germany, France, Canada, the EU and the U.K.
- It will increase the share of renewable energy in installed capacity to 40% of Senegal’s electricity mix by 2030.
- **Polluter taxes** - A tax on shipping emissions may accelerate the momentum on polluter taxes.
- **Carbon markets** - The EU unveiled a call to action on ‘*Paris Aligned Carbon Markets*’ with
- It has the goal of covering at least 60% of global emissions with carbon pricing mechanisms (4% now) and allocating a proportion of the revenues to climate finance.

What are the challenges ahead?

- **Proven solutions** - European leaders to pitched Carbon pricing as a serious suggestion, which is one of the tool in a package of many.
- Developed countries should acknowledge the urgency and scale of financial need and come up with scalable solutions.
- **Responsibility** - There is also a fundamental refusal to own who should be responsible between developed country governments and multilateral institutions.
- **MDBs** - Developed countries focused on MDB reform which will increase the pressure on MDBs’ resources manifold.
- Developed countries want to squeeze more out of existing MDB resources while simultaneously adding on climate as a part of their mandate.
- **Private capital** - The Global North showed an overwhelming emphasis on derisking private capital, shifting the onus of finance to the private sector.
- **Debt** - Debt cancellation, concessional financing and grants, polluter taxes and the consideration that poverty eradication efforts cannot be side lined for climate goals

9.3 Re-entry of US in UNESCO

Why in news?

The United States said that it was re-joining the United Nations Educational, Scientific and Cultural Organization (UNESCO).

What is UNESCO?

- United Nations Educational, Scientific and Cultural Organization (UNESCO) contributes to peace and security by promoting international cooperation in education, sciences, culture, communication and information.
- UNESCO promotes knowledge sharing and the free flow of ideas to accelerate mutual understanding and a more perfect knowledge of each other's lives.
- UNESCO's programmes contribute to the achievement of the Sustainable Development Goals defined in the 2030 Agenda, adopted by the UN General Assembly in 2015.

Why did the US leave the UNESCO?

- **Palestine** - UNESCO, which designates world heritage spots, accorded recognition in 2011 to Palestine as its 195th member and UNESCO is the first U.N. agency to do so.
- This triggered controversies over the historical status of the region's religious symbols and this is also a continuing issue of contention between the already divided Palestinian Authority and Israel.
- The 2012 elevation to a non-member observer status at the UN came as a boost for Palestinians demanding separate statehood.
- **US** - The US had long had stronger ties with Israel and supported its settlements in Palestine.
- As the U.S. laws bar funding to any UN agency that recognises the Palestinian state, the US had stopped funding the UNESCO since its 2011 decision, but the partnership with UNESCO continued.
- **Holy sites** - Meanwhile, Arab nations at the UNESCO have sought to fast-track the designation of holy sites as endangered heritage sites.
- They alleged Israel of making attacks on religious sites, affecting their authenticity and integrity.
- **Hebron** - Notably, UNESCO declared a contested shrine in Hebron city as an endangered Palestinian heritage site.
- While most of Hebron is under Palestine administration, the core of the shrine is surrounded by Israeli military guards.
- Also, a resolution last year condemned Israel for hampering access for the Palestinians to Jerusalem's holy places.

Other forums that US left

- In 2020, President Trump announced the U.S.'s withdrawal from funding the ***World Health Organization and the Paris Agreement***.
- This followed from the Trumpist world view that the U.S. was being short-changed by major polluters such as China and India.
- In the case of WHO, the case was over its inadequate response time to the gravity of the pandemic originating in China.
- Following political change, President Joseph Biden has now brought the U.S. back into the fold of funding WHO as well as ***re-joining*** the climate treaty.

Why did the US return to the UNESCO?

- **China factor** – The reason for the U.S.'s return is ostensibly China.
- The U.S.'s absence had helped China gain more influence in setting the rules around artificial intelligence and the ensuing technological shifts.
- This is the first time that China has been proffered as a reason for the U.S.'s re-entry into, rather than its exit of, a multi-lateral treaty.
- **Israel** – Unlike the America First policies that propelled the Trump administration's exits, the U.S.'s UNESCO re-entry has little to do with why it ***exited*** it in the first place.
- It is not unreasonable to infer that the re-entry is a sign of America's growing paranoia about China.
- It is also appropriate to recall that the Reagan administration withdrew from UNESCO in 1984 for, among other things, advancing Soviet interests.

What is the way forward?

- America might bring in at least \$600 million in outstanding dues to the UNESCO.
- Organisations should get stricter on countries exiting and entering on frivolous grounds, alongside framing policies and research that accommodate the tussles of a hyper-connected world.

9.4 China - Pakistan Nuclear Deal

Why in news?

China and Pakistan signed an agreement for a 1,200 MW nuclear power plant in the Chashma nuclear complex in Pakistan without seeking necessary waivers from the Nuclear Suppliers Group (NSG).

What is the nuclear status of Pakistan?

- **Power plants** - Pakistan is currently operating 6 China-built nuclear plants.
- KANUPP-2 and KANUPP-3 both use 1,100 MW Chinese Hualong One reactors.
- **Treaties** - Pakistan is neither part of the Nuclear Non-Proliferation Treaty (NPT) nor part of Nuclear Suppliers Group (NSG).
- **Status** - The energy sector is running deficit and heavily dependent on imported fuel including oil and LNG.

KANUPP-3 signed in 2013, became a flagship energy project as part of the China Pakistan Economic Corridor (CPEC) of the Belt and Road Initiative (BRI).

What is the nuclear deal signed between China and Pakistan?

- Pakistan is facing a dual energy and [economic crisis](#) and Pakistan is on-going negotiations for a [bailout](#) from the International Monetary Fund (IMF).
- Pakistan signed an agreement for the construction of a **1,200 MW** nuclear plant at the Chashma nuclear complex.
- This is the **fifth** and the **biggest** reactor at the Chashma nuclear complex (C-5) and China had given 'special concessions' for financing the construction of the reactor.

Why has China not sought waivers from the Nuclear Suppliers Group?

- **NSG** - Nuclear Suppliers Group (NSG) is a 48-member grouping that seeks to contribute to the non-proliferation of nuclear weapons.
- NSG explicitly prohibits the transfer of nuclear technology by its members to countries that have not signed the nuclear Non-Proliferation Treaty (NPT).
- **Ambit and Gambit** - China joined NSG in 2004 and thus China's civilian nuclear projects with Pakistan comes under scrutiny of NSG.
- The new deal signed between China and Pakistan for C-5 power plant did not seek NSG.
- China argued that the Chashma 3 and Chashma 4 reactors were 'grandfathered' under its earlier Chashma deals with Pakistan that pre-dated its joining of the NSG.

Role of deal in nuclear governance

- China is blocking the long-running negotiations to include India as a full-fledged NSG member.
- China argued the C-4 and C-5 deals agreed in 2013 as being part of earlier agreements, the KANUPP-2&3.
- The new deals further eroded the global rules governing nuclear commerce.
- It has also raised questions about the relevance and future of the NSG and governance of global nuclear commerce.

How does the India-U.S. nuclear deal differ from the China-Pakistan deal?

- **Waiver** - India and the U.S. sought a waiver from the NSG for their civilian nuclear deal, which was granted in 2008.
- **Commitments** - India undertook a number of international commitments such as
 - Placing facilities under International Atomic Energy Agency (IAEA) safeguards.
 - Separating civilian and military nuclear programmes and continued moratorium on testing.
- Neither has China sought any such waiver from the NSG nor has Pakistan undertaken similar commitments.

9.5 Iran-Afghan Water Conflict

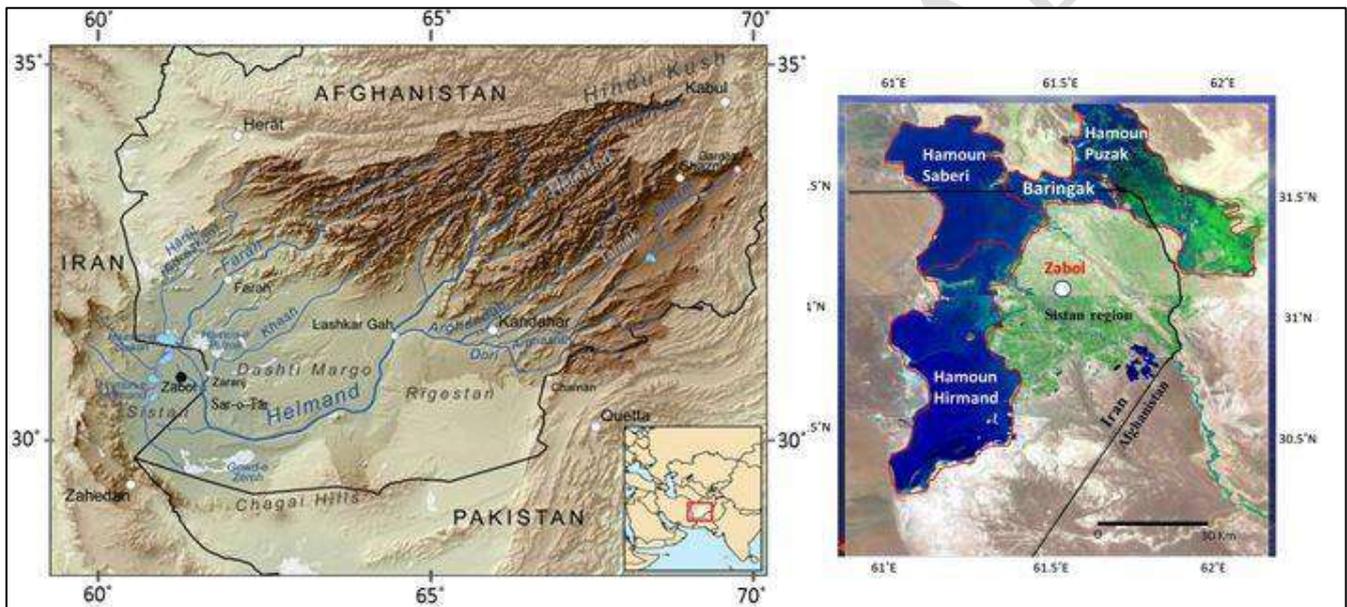
Why in news?

Iran and Afghanistan are locked in a long-standing dispute over the sharing of water from the Helmand River.

What is the conflict?

- **Helmand River** is a vital source of water for both Iran and Afghanistan.
- Afghanistan and Iran have been at loggerheads over the sharing of river water for over a century.
- The Helmand, Afghanistan's longest river originates near Kabul in the western Hindu Kush mountain range.
- It flows in a southwesterly direction through desert areas before emptying into Lake Hamun, which straddles the Afghanistan-Iran border.
- **Lake Hamun** is the largest freshwater lake in Iran.
- Fed by the Helmand, it used to be one of the world's largest wetlands, straddling 4,000 sq.km between Iran and Afghanistan.
- But it has since dried up, experts blame on drought and the impact of dams and water controls.

According to Iran's parliament, 25% to 30% of the population has left the region over the past two decades because of the water shortages.



What is the Helmand River Treaty?

- Afghanistan and Iran signed an agreement called the Helmand River Treaty in 1973 to regulate the allocation of river water.
- But the accord was neither ratified nor fully implemented, causing disagreements and tensions to persist.
- **Iran** - Iran has accused Afghanistan of violating its water rights for years and argues that far less water than the amount agreed to in the 1973 treaty flows into Iran.
- Afghanistan's construction of dams, reservoirs and irrigation systems along the Helmand River is a concern for them. They feel these projects might reduce water flow into Iran.
- **Afghanistan** - Afghanistan has rejected Iran's accusations and has blamed climatic factors like a shortage of rainfall, which resulted in reduced river water volumes.
- They argue that they have rights to expand water storage and irrigation capacities within Afghanistan.

Iran-Taliban ties

- Iran and Afghanistan share a 950-kilometer land border.
- Both countries have no major territorial disputes.
- Iran has so far refrained from formally recognizing the Taliban government.
- But it has been pragmatic and maintained relations with Afghanistan's current rulers.
- Both Iran and Taliban were united in their opposition to the US's presence in the region.

What's the current situation?

- There is a widespread demonstration and political unrest in the Sistan-Baluchistan region.
- Public anger in the eastern Iranian region is growing with the water shortages amidst other socio-economic problems.
- The latest clash between Iranian and Taliban troops has increased the tensions.
- Both the countries have also agreed to set up a commission of inquiry to investigate on the border shootout.

What is the need of the hour?

- Both sides should address the mismanagement of water resources and tackle the environmental problems in the region.
- They should come up with a sustainable solution to resolve the water dispute.
- Both countries need to work more closely together and share information to determine availability and flow of water into Iran.

9.6 Kosovo-Serbia Conflict

Why in news?

The tensions between Kosovo and Serbia escalates and clashes broke out between Serbs protesting in North Kosovo and the NATO-led Kosovo Force (KFor).

What is the Kosovo-Serbia conflicts?

- Both Kosovo and Serbia are countries that lie in the Balkan region of Europe.
- Kosovo is a former province of Serbia that unilaterally declared independence in 2008.
- It is recognised as a country by about 100 nations including the U.S. and several EU- countries but Serbia does not recognise Kosovo's sovereignty and continues to consider it as a part of it.



What are the roots of the conflict?

- **Historic Significance** - The Serbian Empire had gained control of Kosovo in the 12th century.
- Kosovo became the heart of the kingdom with several significant Serb Orthodox Christian churches and monasteries.
- **Ethnic Shift** - In the 1389 Battle of Kosovo, Serbia lost Kosovo to the Ottoman Empire for 500 years.
- During Ottoman rule, there was a shift in ethnic and religious balance in Kosovo, it became a region with majority of ethnic Albanian Muslims.
- **Made a province** - Kosovo became part of Serbia in the early 20th century.
- Post the Second World War, it was eventually made a province (with autonomy) of Serbia.
- **Ethnic rift** - At this point, Kosovo had ethnic Albanian as 90% of its population and they felt the reunion unfair.
- In the 1980s, Kosovo Albanians sought separation from Serbia.
- **Conflict** - In the late 1990s, the Kosovo Liberation Army (KLA), consisting mainly Kosovo Albanians, led an insurgency against the Serbian rule of Kosovo.
- Serbia cracked down on the rebellion by deploying heavy forces in 1998 and 1999.
- **NATO and UNSC** - In 1999, NATO intervened to pull out Kosovo and subsequently, NATO deployed peacekeepers.
- Through the UN Security Council (UNSC) Resolution 1244, a transitional UN-led administration began to head Kosovo.
- **Independence** - In 2008, Kosovo declared independence from Serbia.
- Serbia challenged Kosovo's actions before the International Court of Justice (ICJ).
- The ICJ was of the opinion that Kosovo's declaration was not against international law.

What has happened since 2008?

- An ethnic Serb minority resides in Kosovo makes up to 5.3% of its population.
- The Kosovo Serbs do not recognise Kosovo state institutions.
- They receive pay and benefits from Serbia's budget but do not pay taxes to neither of the governments.
- Since 2008, clashes have broken out on and off in Kosovo's northern region.
- In 2013, both Serbia and Kosovo reached the **Brussels Agreement** brokered by the EU but the agreement was not fully implemented on the ground.
- In July 2022, violent clashes broke out in the northern region over the issue of changing Serbian number plates of vehicles while in Kosovo.
- The ethnic Serbs in the north in protest put up blockades at the 2 border entry points between Serbia and Kosovo, only through which Kosovo citizens can travel to Western Europe.

Why have tensions flared again?

- The ethnic Serbs boycotted the mayoral elections to northern municipalities in 2023.
- As a result of low turnout, ethnic Albanian mayors got elected in these municipalities.
- In protest, ethnic Serb mayors in northern municipalities, local judges and police officers had resigned and also opposed fresh elections to their posts.
- The ethnic Albanian mayors took office in northern Kosovo's Serb-majority area.
- These moves faced protests by Serbs and the U.S. and its allies to rebuked Kosovo.
- These triggered violent clashes between NATO soldiers and Serb protesters.

Where do the resolution talks stand?

- Since late 2015, there has been little progress in reaching new agreements or implementing existing ones.
- In 2018, the then Presidents of Kosovo and Serbia had proposed redrawing borders and swapping some territories between the 2 countries to normalise ties but the EU rejected it.
- **EU plan** - In 2023, the EU proposed a plan to which both Serbia and Kosovo tentatively agreed to. It states -
- Serbia would stop lobbying against Kosovo's candidature in international organisations including the United Nations. In turn, Kosovo was to form an association of Serb-majority municipalities.
- However, the two parties walked out of signing the deal as a result of opposition against it from their own countries.
- **Russian factor** - Serbia has strong historic and military ties with Russia which also supports Serbia's claim.

9.7 Refugees as Assets

Why in news?

The World Refugee Day is celebrated on June 20 every year to honour the courage and resilience of the individuals displaced due to conflicts and unrest worldwide.

How can the barriers be dismantled?

- **Obstacles** – Refugees and asylum seekers encounter a myriad of obstacles, such as legal recognition and challenges in obtaining government-issued documents.
- These obstacles hinder their access to essential services, including financial support and health care.
- **SDG** – To ensure that truly no one is left behind, it is necessary to engage with and include youth, especially refugee youth, in the realisation of the Sustainable Development Agenda.
- **Global Compact on Refugees** – It acknowledges the magnitude of the displacement crisis and calls for solidarity through a whole of society approach.
- It strives to enhance the international response, support host countries, promote self-reliance, and explore long-term solutions such as resettlement and safe returns.
- **Individual contribution** – It is built on the understanding that the responsibility towards the forcibly displaced is not limited to governments but extends to each, individuals.

- The individuals include the private sector, non-government organisations and community-based organisations.
- **Global South** – It also recognises that the [Global South](#) is disproportionately affected and that host communities need assistance

What is the way forward?

- Addressing the rising number of the forcibly displaced is a moral imperative that demands our collective action.
- It is incumbent to ensure equal opportunities in employment, education, housing, and health care.
- The principle of equitable burden-sharing should be accepted and the responsibilities should be fulfilled.
- Together, we can truly ensure the Government of India's vision of 'Viksit Yuva Viksit Bharat' is realised.

Status of Refugee Crisis

- **Global** - Around 103 million individuals who have endured forced displacement due to conflicts and unrest worldwide.
- These staggering figures mask countless human stories marked by loss and shattered dreams.
- Global conflicts includes the ongoing wars in [Ukraine](#), [Myanmar](#) and Sudan among others, and the protracted situations in Afghanistan, and Somalia present an unprecedented challenge.
- **India** – It is home to some 250,000 forcibly displaced persons, with women and children constituting half of that population.
- India continues to graciously host and assist [refugees](#) and asylum-seekers within its territory, a testament to our shared humanity.

G.S PAPER III

10. ECONOMY

10.1 Withdrawal of 2000 Rupee Notes

Why in news?

The Reserve Bank of India's (RBI's) decision to withdraw its highest denomination currency note from circulation is likely to improve banking system liquidity.

What was the 'precision strike'?

- **Introduction** - The 2000 rupee note was introduced in *November 2016* to address the aftermath of demonetisation to meet the currency requirement of the economy in an expeditious manner.
- **Withdrawal** - The RBI decided to withdraw 2,000 rupees notes from circulation as a part of its currency management.
- The 2000 rupee notes continues to be *legal tender*, as the withdrawal is not regarded as demonetisation.
- These notes can be exchanged at any bank branch or RBI offices up to September 30, 2023.
- Exchange of Rs.2,000 bank notes to notes of other denominations can be made up to a limit of Rs 20,000 at a time.

To know more about this withdrawal, [click here](#).

What are the impacts of 2000 rupee note withdrawal?

- The '[Clean note policy](#)' tries to improve banking system liquidity, bringing down the elevated short term rates.
- The deposit of 2000 rupee notes in bank can boost the repayment of loans, consumption and a possible GDP boost.
- **Liquidity** - About 2.5-3 trillion rupees of banking sector liquidity leaks out as currency in circulation each year.
- The Deposit of 2,000 rupee notes in Banks could result in a boost in bank deposits and its liquidity.
- **Deposit** - There is a surge in incremental C/D (Credit-Deposit) ratio, nearing pre-pandemic levels.
- The banks are ready to meet funding needs from diverse sectors giving boost to the economy.

In value terms, share of 2,000 rupee denomination notes (at Rs.3.62-lakh crore) was at 10.8% as on March 2023.

ICICI Securities Primary Dealership estimates the liquidity surplus could increase to Rs.1.5-2 trillion.

- **e-RUPI push** - The absence of higher denomination notes gives rise to the usage of digital payments.
- The RBI's retail CBDC project (**e-RUPI**) is ready to hit the streets.
- It will propel faster adoption of e-RUPI for merchant transactions, concurrent with physical fiat currency.
- **Short term rates** - If liquidity surplus improves sharply because of these deposits, the weighted average call rate could sustain below the repo rate for a short period of time.
- Short-term interest rates for G-secs, bank bulk deposits and corporate borrowings is also likely to ease.
- **T-bills** - Due to the ease in interest rates, there will be a demand for Treasury bill auctions.
- **Bonds** - The spill over to 3-year and 5-year bonds and yields of such notes could fall by up to 10 basis points.

10.2 IMF's World Economic Outlook (WEO) (April 2023)

Why in news?

IMF's latest World Economic Outlook (WEO) has stated that outlook is uncertain again amid financial sector turmoil, high inflation, ongoing effects of Russia's invasion of Ukraine, and three years of COVID.

What is the World Economic Outlook about?

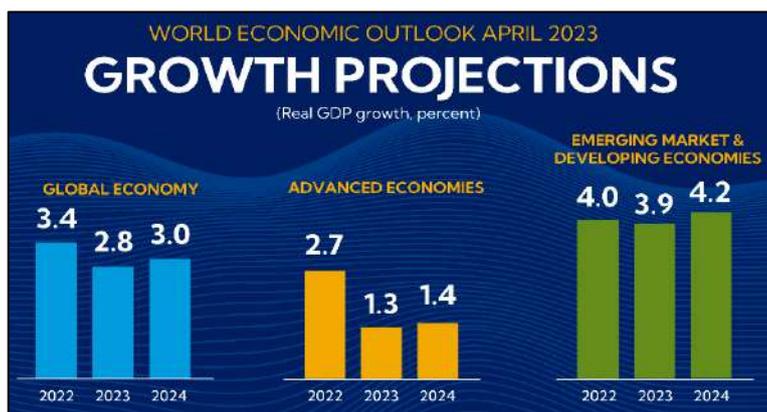
- The World Economic Outlook (WEO) is an **International Monetary Fund (IMF)** report providing output, inflation, employment, fiscal balances, and debt statistics for member countries.
- The report forecasts the global growth, summarizes the state of global economy and highlights the most important developments.
- The IMF publishes the WEO report twice a year (April and **October**) based on data obtained from its consultations with member countries' governments.
- The IMF also publishes two additional and less comprehensive WEO updates a year, each three months after the main WEO report.

What is the model used by IMF?

- **Macroeconomic model** – The IMF used a macroeconomic model based on Platzer and Peruffo (2022) to analyse the impact of different forces on the world economy.
- This includes foreign developments affecting domestic interest rates through net international capital flows.
- **8 economies** – The model represents 8 major global economies, including the United States, Japan, Germany, the United Kingdom, France, China, India, and Brazil.
- The model is calibrated to reflect demographic developments, productivity trends, retirement age, and other factors.
- **Global GDP** – These are the five largest advanced economies and the three largest emerging market and developing economies, which cover some 70% of global GDP.

What are the findings of the latest report?

- The baseline forecast is for growth to fall from 3.4% in 2022 to 2.8% in 2023, before settling at 3.0% in 2024.
- Advanced economies are expected to see an especially pronounced growth slowdown, from 2.7% in 2022 to 1.3% in 2023.
- In a plausible alternative scenario with further financial sector stress, global growth declines to about 2.5% in 2023 with advanced economy growth falling below 1%.
- Global headline inflation in the baseline is set to fall from 8.7% in 2022 to 7.0% in 2023 on the back of lower commodity prices but underlying (core) inflation is likely to decline more slowly.
- Inflation's return to target is unlikely before 2025 in most cases.



Global Prospects and Policies

- **Steady growth** – Tentative signs in early 2023 that the world economy could achieve a soft landing, with inflation coming down and growth steady.
- **Price pressure** – Although inflation has declined as central banks have raised interest rates and food and energy prices have come down, underlying price pressures are proving sticky.

Rate of Interest

- **Real interest rate** – The natural rate of interest, the real interest rate that neither stimulates nor contracts the economy, is important for both monetary and fiscal policy.
- It is a reference level to gauge the stance of monetary policy and a key determinant of the sustainability of public debt.
- Once the current inflationary episode has passed, interest rates are likely to revert toward pre-pandemic levels in advanced economies.

Public Debt

- **Public debt** – Public debt as a ratio to GDP soared across the world during COVID-19 and is expected to remain elevated.
- This poses a growing challenge for policymakers, particularly as real interest rates are rising across the world.
- Economic growth and inflation have historically contributed to reducing debt ratios.

Geo-economics Fragmentation and Foreign Direct Investment

- **Geopolitical tensions** – Supply-chain disruptions, rising geopolitical tensions, brought the risks & potential benefits of geo-economics fragmentation to the centre of the policy debate.
- **FDI** – FDI flows are increasingly concentrated among geopolitically aligned countries, particularly in strategic sectors.
- Several emerging market and developing economies are highly vulnerable to FDI relocation, given their reliance on FDI from geopolitically distant countries.
- Multilateral efforts to preserve global integration are the best way to reduce the large and widespread economic costs of FDI fragmentation.

What is the forecast for India?

- **In bright spot** – The International Monetary Fund (IMF) has identified India as a bright spot in the world economy and a key contributor to global growth in the coming years.
- **Contribute to global growth** – The report showed that India is likely to grow 5.9% in 2023 and will contribute 15% of the global growth in 2023.
- **Impressive performance** – The report cites India's impressive performance, with digitization helping to pull the country out of pandemic lows.
- **Prudent policies** – The country also has prudent fiscal policies and significant financing for capital investments which are expected to sustain growth momentum.

10.3 Sugar Subsidies at WTO

Why in news?

India is in negotiations with Brazil to resolve a long-standing dispute about sugar subsidy at the World Trade Organisation (WTO).

What is WTO?

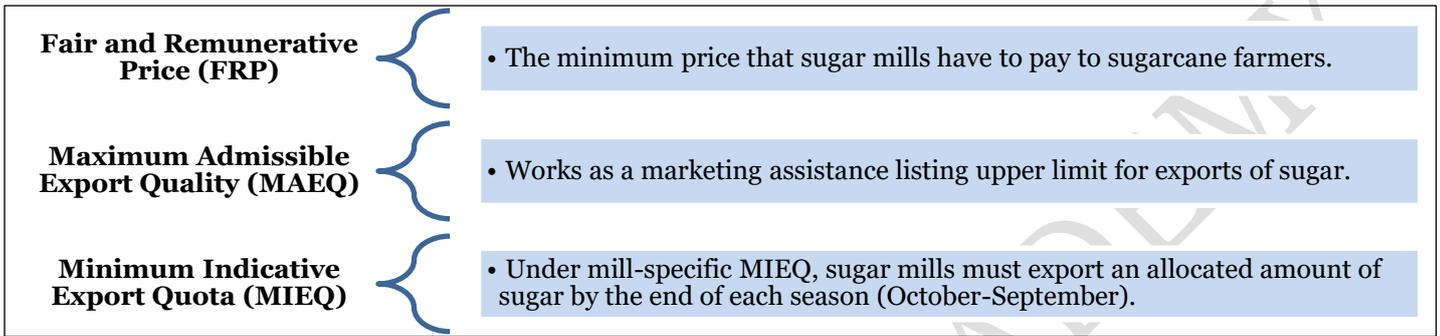
- The [World Trade Organization](#) is the only international organization that deals with the rules of trade between countries.
- **Establishment**- In 1995 superseding the 1947 *General Agreement on Tariffs and Trade (GATT)*.
- **Members**- The WTO is run by its 164 members representing 98% of world trade.
- **Decision making**- Unlike other organisations, such as the IMF or World Bank, WTO does not delegate power to a board of directors or an organizational chief.

India is the 2nd-largest exporter of sugar in the world behind Brazil.

- All decisions are taken through *consensus* and any member can exercise a veto.

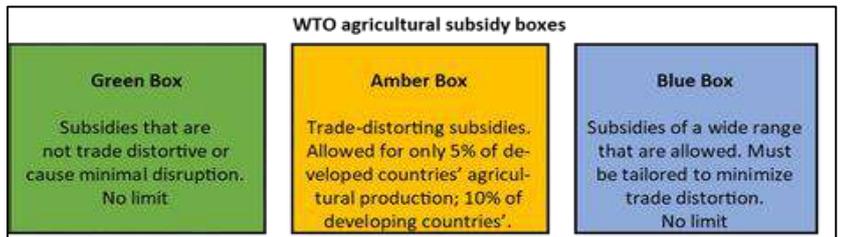
How disputes are settled in World Trade Organisation (WTO)?

- The bilateral consultation is the first step to resolve a dispute as for the proceedings in the WTO.
- The sides when unable to resolve the matter through consultation, can approach the *Dispute Settlement Panel*.
- The panel’s report can be challenged before an *Appellate Body* whose decision will be *final*.
- However, the body is unable to review cases at present given *ongoing vacancies*.
- India is in bilateral talks with Brazil to resolve the long-standing sugar dispute at WTO.



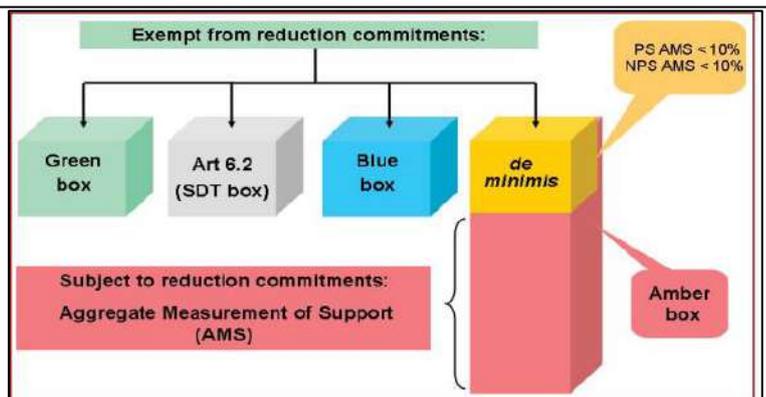
What is the dispute about?

- In 2019, Brazil had submitted a complaint against India in WTO alleging that India’s according of sugar subsidies was inconsistent with its trade rules.
- **Support measures** - The complainant argued against the
 - Minimum prices of sugarcane and sugar
 - Fair and remunerative prices (FRP)
 - Specific states enforcing higher minimum prices
 - Minimum Indicative Export Quota (MIEQ)
- **Reason** - Brazil, Australia and Guatemala criticized that India's support measures to sugarcane producers exceed the de Minimis level of **10% of the total value of sugarcane production**.
- The countries argued that the sugar subsidies incentivised Indian sugarcane farmers which led to increased domestic production of sugarcane and sugar.
- It contended that with production exceeding domestic demand resulting in increased sugar stocks the government intervention facilitated lowered prices for the commodity in the global market.



What did the WTO say?

- WTO constituted a panel to study the allegations in October 2019, which submitted its report in December 2021.
- The WTO panel report concluded that India was providing ‘lump sum assistance’ for expenses emanating on account of sugar towards maximum admissible export quality (MAEQ).
- The panel stated that the support measures of India are inconsistent with WTO trade rules under Article 7.2 (b) of the Agreements on Agriculture (AoA).
- The WTO asked India to withdraw its exports subsidies within 120 days from the circulation of the report.



What is India's defence?

- **India's Stand** - The Indian government stated the dispute panel's findings are unreasonable and not supported by the WTO rules
- The report also evaded key issues which it was obliged to determine.
- India held that the schemes are meant to support sugarcane producers and exports and are well within its obligations under the WTO agreements.
- **Appeal** - In January 2022, [India appealed](#) against the panel's ruling at the WTO's appellate body stating that the panel 'grossly errs' in holding that the MAEQ were of the 'same essence' as other alleged export subsidies.
- Further, it contended that FRP and state-advised prices do not constitute 'applied administrative prices'.

Article 7.2 (b) of Agreement on Agriculture - Members cannot provide support in excess of the de Minimis standards.

Sugar Production in India - Last Year and Ongoing Season

- In Sugar Season (Oct-Sep) 2021-22, India emerged as the world's **largest producer and consumer** of sugar.
- India had exported 11 million tonnes in the last year where the production stood at 35.9 million tonnes.
- For the ongoing sugar season, the production is estimated to be 32.8 million tonnes.
- India had allowed exports of 6.1 million tonnes for the ongoing season exhausting the quota.

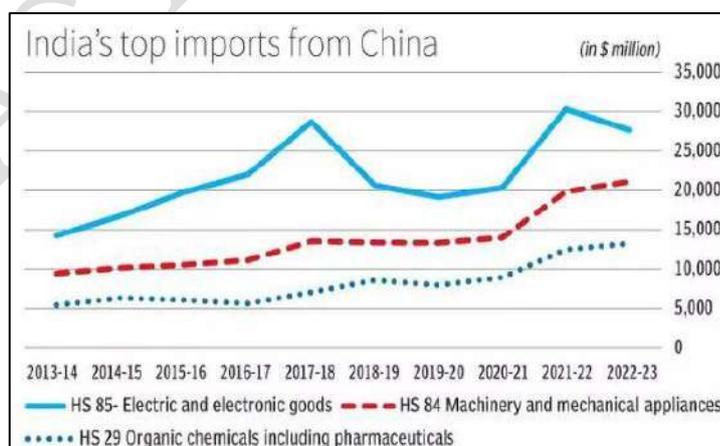
10.4 India's Trade Dilemma with China

Why in news?

China has emerged as India's top source of imports and the share of China in India's total merchandise imports has steadily increased.

What is the status of India's imports and exports?

- **Exim imbalance** – India exports primary, low value added produce, but imports intermediates and manufactured items.
- **China's domination** – India has signed many Free Trade Agreements with different countries, however, there has been no noticeable decline in China's market share in India's total imports.
- **China+1** – Contrary to the global slogan of "China plus One", trade deficit between India and China has been high and growing.



What are the commodities that constitute the Indo-China trade basket?

- **Harmonized System (HS)** – The HS of global trade is a standardised numerical method of classifying traded products.
- Using the dataset on international trade maintained by the Ministry of Commerce, 10 product groups' account for about 80% of India's total imports from China.

Import basket	Export basket
<ul style="list-style-type: none"> • At HS 2-digit level – Among these, the top three product groups, make up for more than 60% of India's total imports from China. • These product categories include products like electronic goods, mobile phones, semiconductors, electrical appliances, organic chemicals including pharmaceuticals. 	<ul style="list-style-type: none"> • India's exports to China have been more volatile and the latest data show that in 2022-23, India's exports to China has declined in absolute terms. • India's merchandise imports from China was more than 6 times of its merchandise exports to China. • Refined petroleum – These products have become India's most important export item to China.

<ul style="list-style-type: none">• In each of these three product categories, China's share in India's total imports varies between 40 and 50%.• And for the last 10 years these top 3 product categories have remained unchanged.• At HS 4-digit level – India's top 10 imports from China are mostly value-added manufacturing products.• These are electrical goods and machinery, electronics and semiconductors, organic chemicals and pharmaceuticals.	<ul style="list-style-type: none">• Agri products – Other than that, India's exports to China have been mostly dominated by agricultural goods and metals.• Metal ores – Iron ores, semi-finished products of iron, copper and copper products, cotton and cotton yarn, fish and marine products, vegetables, vegetable oils and rice are India's major export items to China.
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What does these trade patterns indicate?

- **More import than export** – Such trade pattern reveals that trade is not only highly unbalanced between China and India, but India is also primarily exporting low value added products.
- India mostly imports value-added manufacturing goods and intermediate goods from China.
- **Low value exports** – India's exports are mostly resource intensive primary or semi-processed products.
- In international trade, it has been observed that countries which operate at the lower end of the value chain tend to gain much less from trade.
- This is because gains from exports depend to a large extent on domestic value addition and export sophistication.
- While China has emerged as a big export market for India, India ends up exporting low value-added goods to China, then its gains will be limited.

Does manufacturing sector gain from this trade pattern?

- **Cheap inputs** – It can be argued that certain manufacturing sectors in India may be gaining from Indo-China trade as availability of cheap intermediate inputs from China.
- **Competitive markets** – The cheap inputs has possibly helped them stay competitive in the domestic and international markets.
- However, it is also true that some sub-sectors of Indian manufacturing may have been adversely affected because of imports from China.
- However, such inter-sectoral trade-offs are inevitable in international trade.

Among India's top imports from China, most of them are intermediate goods which are used as inputs in Indian industries.

What can India do?

- **High value exports** – If India wants to make a mark in the global value chain and at the same time emerge as a manufacturing giant, then Indian exports need to move up the value chain.
- **Impetus to manufacturing** – The renewed emphasis on manufacturing in India should further improve the quality of Indian exports.
- Given that China is the world's second largest economy, it is a huge market and India must look to break into the higher value-added segments there.
- India's trade strategy needs to be linked up with China in a more organic manner and come out from its current pattern.

10.5 Challenges of Moving from LIBOR

Why in news?

The RBI has set a deadline of **June 30, 2023**, for complete switch-over from LIBOR and some banks and financial institutions (FI) are yet to facilitate an absolute transition.

What is LIBOR?

- London Interbank Offered Rate (LIBOR) is a global benchmark interest rate for unsecured short-term borrowing in the interbank market.
- It combines individual rates at which banks opine they may borrow from each other (for a particular period of time) at the London interbank market.

- It is used as a benchmark to settle trades in futures, options, swaps and other derivative financial instruments in over-the-counter markets and on exchanges globally.
- Further, consumer lending products like mortgages and credit cards, too use it as a benchmark rate.

Why are we moving from LIBOR?

- In India, several banks and financial institutions (FIs) followed LIBOR.
- The **Financial Conduct Authority (FCA)** of UK [ended the Libor](#) settings in 2021, except for certain types of tough legacy contracts which could not be transitioned.
- Owing to the LIBOR scandals and reforms to provide risk-free interest rates, RBI recommended [transitioning from LIBOR](#).

What did the central bank of India do?

- The LIBOR transition will impact a wide range of financial institutions across various sectors of the financial industry.
- These institutions need to change their existing contracts and develop new products based on alternative reference rates.
- The RBI has issued two circulars giving the road map to the transition and arrangements for transition from LIBOR.
- It established a system of *alternative reference rates* (ARRs) that allows banks to choose rates from a basket of currencies for international financial transactions.
- The RBI continues to monitor the efforts of banks/FIs for ensuring a smooth transition from LIBOR.

What are the benefits of transition?

- The transition from LIBOR has the potential to reduce the cost of financing in several ways.
- **Risk Premium** - The calculation of alternative reference rates is based on more transparent methodologies which certainly can help reduce the risk premium associated with LIBOR.
- **Pricing** - Introduction of ARRS increases competition for reference rates which lead to more transparent and competitive pricing of financial products.
- This potentially results in lower financing costs for borrowers.
- **Liquidity** - the alternative reference rates increased liquidity can lead to more efficient pricing and tighter spreads in the market, benefiting borrowers.
- **Harmonisation** - The increased harmonisation can help reduce the cost of financing for borrowers accessing international markets.
- The alignment of Indian banks and FIs to international standards promotes consistency and comparability across markets, reducing uncertainty and facilitating cross-border transactions.

What is the way forward?

- Capacity building of financial institutions such as pension funds, insurance companies, hedge funds, and non-banking institutions needs to be done.
- Supplement the capacity of these institutions to evaluate and select appropriate alternative reference rates that are recommended by the RBI.

Challenges in transition

Alternative

- Different jurisdictions have chosen different rates, such as the SOFR in the US, SONIA in the UK, TONA in Japan and EU-STR in the Euro Zone.

Fallback provisions

- Transitioning these contracts to alternative rates requires addressing the fallback provisions,

Internal Changes

- Making significant adjustments to internal systems, processes, and models.

Technology aspects

- Banks and FIs need to invest in the necessary technology upgrades and ensure smooth integration without disrupting day-to-day operations.

ARR

- The introduction of alternative reference rates (ARRs) also poses challenges of market liquidity and product availability.

Legal challenges

- Contract interpretation, amendment, and litigation arising from the transition process.

Awareness

- Effective communication and engagement with clients and stakeholders by banks and FIs needed to educate their clients about the upcoming changes.

10.6 Evergreening of Loans

Why in news?

The Reserve Bank of India (RBI) Governor Shaktikanta Das raised red flags over banks adopting innovative methods for evergreening of loans.

What does evergreening of loans mean?

- The evergreening of loans is a term in which banks try to revive a loan that is on the verge of default by granting further loans to the same borrower.
- It is a form of zombie lending in which banks provide more loans to the borrowers to stop them from turning into huge non-performing assets.
- The process of evergreening of loans is typically a temporary fix for a bank covering up the real status of stressed loans.

A loan turns into a nonperforming asset (NPA) if the interest or instalment remains unpaid even after the due date and remains unpaid for a period of more than 90 days.

Why do banks follow evergreening of loans?

- If an account turns into a non-performing asset (NPA), banks are required to make higher provisions which will impact their profitability.
- To avoid classifying a loan as an NPA, banks adopt the evergreening of loans.
- Banks offer fresh loans to borrowers on the verge of default to ensure they repay an old loan.
- Banks delay the recognition of losses through evergreening process.
- Banks also avoid provisioning to cover loan losses and increase their liquidity.

What do bankers say?

- It is difficult for banks to indulge in the evergreening of loans as the RBI monitors each and every loan on a regular basis. Once an account is classified as an NPA, the situation will become worse.
- By evergreening, banks try to save a borrower from becoming NPA by extending temporary liquidity.

Evergreening Methods	Problems in Evergreening Methods
<ul style="list-style-type: none"> • Bringing two lenders together to evergreen each other's loans by sale and buyback of loans or debt instruments. • Good borrowers being persuaded to enter into structured deals with a stressed borrower to conceal the stress. • Use of internal or office accounts to adjust borrower's repayment obligations. • Renewal of loans or disbursement of new/additional loans to the stressed borrower or related entities closer to the repayment date of the earlier loans. 	<ul style="list-style-type: none"> • Bad loans are made to look good at the risk of additional lending to unviable borrowers. • Evergreening of loans put lenders at risk of huge amounts of default. • The RBI does not approve of evergreen loans and it is going against its norms. • This is a misgovernance in banking.

How can ever greening be stopped?

- The audit committee needs to be particularly vigilant.
- It becomes necessary to levy penalties and action against the erring officers.
 - Penalties should be levied through cancellations of unvested stock options.
 - Claw-back of monetary bonuses on officers concerned and on all whole-time directors.
- The Chairman of the audit committee could be asked to step down from the board.

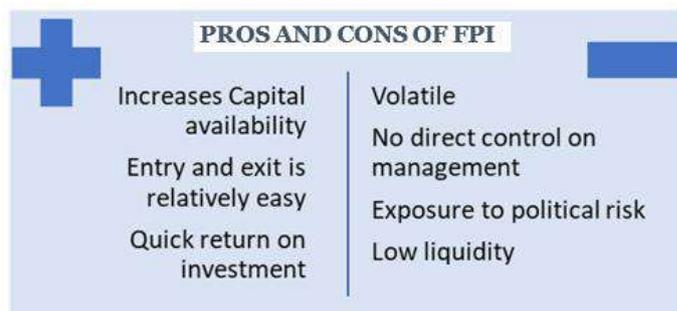
10.7 Foreign Portfolio Investors

Why in news?

SEBI floated a consultation paper that proposed additional disclosures from Foreign Portfolio Investors (FPIs).

Who is a Foreign Portfolio Investor (FPI)?

- FPI involves holding financial assets from a country outside of the investor's own.
- FPI holdings can include stocks, ADRs, GDRs, bonds, mutual funds, and exchange traded funds.
- Foreign Portfolio Investors have only passive ownership and investors have no control over ventures or direct ownership of property or a stake in a company.
- Investments of NRI's don't come under FPI.



What are the differences between FPI and FDI?

- Both Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) are common ways for investors to participate in an overseas economy but has few distinct differences.

	Foreign Direct Investment (FDI)	Foreign Portfolio Investment (FPI)
Definition	Investment made by foreign investors to obtain a substantial interest in the enterprise located in a different country.	Investing in the financial assets of a foreign country, such as stocks or bonds available on an exchange.
Type	Direct Investment	Indirect Investment
Market	Inflows in primary market	Inflows in secondary market
Role of Investors	Active Investor	Passive Investor
Degree of Control	High control	Very low control
Term	Long term investment	Short term investment
Investment is done on	Physical assets of the foreign country	Financial assets of the foreign country
Entry and Exit	Difficult	Relatively easy
Risks Involved	Stable	Volatile

What is the purpose of the proposal?

- To guard against possible circumvention of the requirement pertaining to Minimum Public Shareholding (MPS)
- To prevent the misuse of the FPI route to circumvent the requirements listed Press note 3.
- To identify tangible ownership and curtail incidences of multiple routes being used to acquire ownership
- To keep up with the minimum public shareholding norms and reduce regulatory requirements.
- To enhance transparency, fully identifying objective ownership of an entity in a holding.

What are the proposals made in SEBI's consultation paper?

- The proposed legislation categorises FPIs into low risk, moderate risk and high risk.
- **High Risk FPIs** - FPIs holding more than 50% of their equity asset under management (AUM) in a single corporation or with an overall holding in Indian equity markets of over Rs 25,000 crore.
- High-risk FPIs would have to make additional disclosures under this proposal.
- Existing operational FPIs should disclose within 3 month, failing which the FPI should bring down its AUM below the threshold within the time frame.
- Any high-risk FPI which fail to provide the disclosures wherever required would render the registration of the FPI invalid.
- **Exception** - New FPIs and existing FPIs that are winding down would be allowed to breach the threshold criteria up to a period of 6 months, after which disclosure in mandatory.

10.8 First Loss Default Guarantee for Fintechs

Why in news?

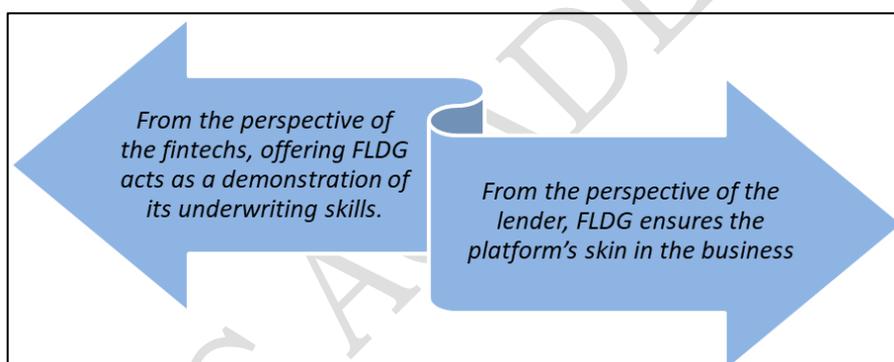
The Reserve Bank of India (RBI) has allowed First Loss Default Guarantee (FLDG) for fintech Lending Service Providers (LSP).

What is an FLDG arrangement?

- Default loss guarantee (DLG) is also known as First Loss Default Guarantee (FLDG).
- First loss default guarantee (FLDG) is a lending model between banks or non-banking finance companies (Regulated Entities) and lending service providers (fintech firms).
- In FLDG arrangement, the initial hit on a default is taken by a third party such as fintech firm that originated the loan.
- The fintech player (LSP) compensates lenders if the borrower defaults up to a certain threshold of the loan portfolio.

How do FLDG work?

- The LSP provides first loss guarantee up to a pre-decided percentage of loans generated by it.
- The loan portfolio backed by FLDG is similar to the off-balance sheet portfolio of the LSP.
- The lender do not partake in any lending process but the nominal loans sit in the balance sheet of the lender.
- But the credit risk is borne by the LSP without having to maintain any regulatory capital.



Why do we need FDLG?

- To avoid 'synthetic securitisation' as it is prohibited by the RBI.
- REs were hesitant to lend through fintechs without commitment towards loan loss.
- Fintech industry's business is affected by RE's hesitancy.

What did the RBI say on FDLG?

- The RBI has released a circular clearly specifying details on scope, eligibility, structure, form, cap, disclosure requirements, and exceptions.
- **Conditions** - A Regulated Entity (RE) can enter into DLG arrangements only with an LSP or other REs with which it has entered into an outsourcing (LSP) arrangement.
- The LSP-providing DLG must be incorporated as a company under the Companies Act, 2013.
- The total amount of DLG cover on any outstanding portfolio does not exceed 5% of the amount of that loan portfolio.
- The guarantee is accepted by the bank only in the form of a cash deposit, or fixed deposits in a bank.

What are the benefits of FDLG?

- Facilitates orderly development of the digital lending ecosystem and boosts fintech activity in the financial sector.
- Enhances credit penetration through digital space.
- Facilitate entry of small and medium fintechs into the digital lending space in partnerships with banks or NBFCs.
- The guidelines facilitates all players to participate in an effective and transparent manner.

Quick Facts

- **Regulated Entity (RE)** - All Commercial Banks (including Small Finance Banks), Co-operative Banks and Non-Banking Financial Companies (NBFC) as per RBI.
- **Lending Service Providers (LSP)** - Fintech players who use technology platforms in the lending space.
- They are agents of a bank or NBFC who carry out one or more of a lender's functions.
- The functions include customer acquisition, underwriting support, pricing support, disbursement, monitoring and recovery of specific loan on behalf of REs.
- **Underwriting** - It is the process through which an individual or institution takes on financial risk for a fee.
- **Synthetic Securitisation** - A structure where credit risk of an underlying pool of exposures is transferred (in whole or in part) through the use of credit derivatives or credit guarantees.
- In this, the credit risk of the portfolio remains on the balance sheet of the lender.

10.9 Greedflation

Why in news?

There is a growing consensus across the world that corporate turns crisis into an opportunity for businesses to make supernormal profits.

How inflation is contained in an economy?

- Inflation is the rate of increase in prices over a given period of time.
- Central banks use monetary policy to contain the inflation.
 - It raise interest rates to bring overall demand in line with overall supply containing demand-pull inflation.
 - It raise interest rates to contain demand which in turn contains cost-push inflation.
- In case of Greedflation, the whole monetary policy prescription becomes more unjust and ineffective because it is neither due to higher input cost nor due to excess demand.

What is Greedflation?

- Greedflation is the exploitation of inflation by corporates to create excessive profits. It simply means (corporate) greed fuelled inflation.
- In normal inflation situation, corporates go for the wage-price spiral, whereas in Greedflation corporates choose the profit-price spiral.

Cost-push inflation

- Prices get pushed up because input costs have risen

Demand-pull inflation

- Prices are pulled up because there is excess demand

Wage-price spiral

- A cyclical condition where the rise in wages leads to increased prices, resulting in inflation

Profit-price spiral

- Companies exploit the existing inflation by putting up their prices way beyond just covering their increased costs

- This is used to maximise their profit margins that, in turn, further fuelled inflation.
- Greedflation happens in two scenarios.
 - When the price mark-up is far in excess of the increase in inputs.
 - When businesses do not bring down the market prices even when the input prices fall.

What are the implications of greedflation?

- Less likeliness to spend money will lead to reduced economic activity.
- Creates social unrest due to raising cost of living.

According to the Centre for Monitoring Indian Economy (CMIE), '60% of the growth in net profit can be attributed entirely to the increase in profit margin.'

- Forces governments to intervene like windfall tax to contain inflation.
- Reduces the purchasing power of the people making even basic needs hard to afford.
- On the corporates' side it affects the business as well as loss of customer trust.

Is Greedflation happening in India?

- Net profits of 4,293 listed companies reached Rs.2.9 trillion in the March 2023 quarter.
- This spike in profits is over 3.5 times the average quarterly profit earned by listed companies till before the pandemic of 2020.
- The data shows the Indian corporate sector has generated superlative profits in the post pandemic period.
- The sharp spike in profits depicts there is a very good chance that corporate greed also played a role in spike the inflation rate in India.

11. AGRICULTURE

11.1 Issues in the Food Storage Plan

Why in news?

The Union government has announced 'World's Largest Grain Storage Plan in Cooperative Sector'.

What is the new initiative?

- **IMC** - An Inter-Ministerial Committee (IMC) will be constituted under the Chairmanship of Minister of Cooperation and the 3 concerned ministers as its members.
- The IMC converges 8 ongoing schemes of three ministries - Minister of Agriculture and Farmers Welfare, Minister of Consumer Affairs, Food and Public Distribution, Minister of Food Processing Industries.
- The plan entails setting up various types of agri-infrastructure, including warehouse, custom hiring center, processing units, etc. at the level of PACS, thus transforming them into multipurpose societies.
- The initiative also aims to create additional decentralised grain storage at the block level.
- **Investments** - The cooperative sector will manage the public investments.
- The new initiative tries to address two of the most important objectives of farm laws -
 - Strengthening/expanding the market infrastructure.
 - Ensuring remunerative prices to farmers.

The value of food losses (agriculture, horticulture, milk, meat and fish) are above Rs. 1,40,000 crore

What are the important aspects that need to be considered?

- Reducing post-harvest losses should be a key objective of the new storage infrastructure.
- Strengthening the infrastructure in the existing market yards.
- Creating storage facilities within the market yards, wherever possible.
- Providing safe and secure market yards, especially protecting stocks from natural calamities.

India has the storage capacity for only one-eighth of its annual perishable produce.

What are the issues?

- **Governance** - Coordination and cooperation between the States and the Centre is required to strengthen storage facilities.
- **Coops' shortfalls** - Elite capture, bureaucratic/political interference, poor marketing are few problems associated with agriculture co-operatives.
- **Overlap** - Farmer Producer Organisations (**FPOs**) are also involved in post-harvest handling of the produce and are promoted to address the limitations of co-operative societies.
- Multiplicity of institutions with cross-cutting objectives are likely to dilute their effectiveness.

- **Maintenance** - Capital maintenance expenditure (Capex) is rarely incorporated into annual budgets making managing and maintaining is a bigger challenge.
- **Elite Farmers** - Elite capture is rampant in co-operatives. Thus small and marginal farmers lose on gaining access to competitive markets and getting remunerative prices.

What should be done?

- Modernising the existing storage infrastructure should be a priority.
- Judicious planning and estimation of storage requirements for different products across the regions.
- There is need for creating adequate storage facilities for horticultural crops, given their increasing production.
- Create storage infrastructure for perishable commodities like fruits, vegetables, milk, meat, fish, etc.
- Processing the perishables can increase the longevity of the food but modern technologies are required for ensuring high quality processing.

11.2 Precision Farming

Why in news?

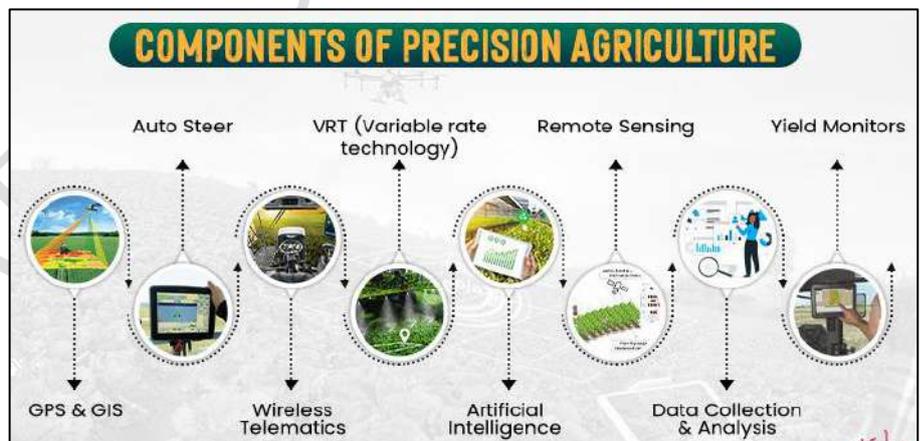
India's food requirement is likely to go up from the present level of 330 million tonne (MT) to more than 500 MT by 2050. India needs to meet the growing demand for food amidst shrinking land size.

What is 'Precision farming'?

- **Precision farming** is a site-specific crop management concept based on observing, measuring and responding to inter- and intra-field variability in crops.
- This involves leveraging digital tools such as *AI, Machine Learning, and IoT* to optimise crop yield and quality while minimising costs and resources.
- It is also referred to as precision agriculture, satellite agriculture, and site-specific crop management (SSCM).

How Precision farming happens?

- The following things are needed to increase the efficiency of the input resources
 - Quality estimation of the seeds to be cropped
 - Well-prepared soil
 - Precise seeding advisory
- **Farming Stage** - Based on the soil health analytics, the amount and type or micro/macro nutrients is decided and added to the soil.
- IoT enabled soil sensors combined with remotely sensed data through drones/satellites and fast processing determines what the soil needs.
- This information is either send as a notification to the farmer's phone or through a central server.



What are the benefits of precision farming?

- In order to meet the growing demand for food amidst shrinking land size, precision farming is a promising solution avoiding crop failure.
- It also helps in understanding and planning for the next farming season.
- Effective inspection of the field with infrared cameras based on their real-time information improves crop surveillance.
- *Data-based harvesting* decisions can increase the efficiency of farming decisions.
- Farmers can estimate when the *nutritional content* is highest in the crop through digital tools.

- Digital tools helps farmers with price, storage, transportation and logistics information.
- Precision technology can play a useful role in 'traceability in supply chain', particularly in exports

What is the way forward?

- **Farm Digitization** - Scaling up of digital agriculture in India by bringing digitisation to the farm.
- **Effective partnership** - Learnings can be drawn from several successful examples of partnerships between stakeholders within India and around the globe.
- **Digital Infrastructure** - Development of digital public infrastructure for farmers is needed.
- **Accessibility** - Government subsidising the cost of technology to enable them move towards digital technology.
- **Carbon trade** - Creation of carbon credits for the farmers would encourage the adoption of precision agriculture.

Issues in adapting precision farming
Data collection <ul style="list-style-type: none">•The prominence of <u>segregated smallholder</u> farms in the country, which makes data gathering a complicated activity.
Lack of centralised Repository <ul style="list-style-type: none">•Data of different geographical locations, weather, soil types, crop types, and other parameters are needed to make a viable technology-based model.
Cadastral data <ul style="list-style-type: none">•To improve analytics, Cadastral data with administrative boundaries and geo-coded soil data must be made available through public sources.
Disparate data <ul style="list-style-type: none">•Rich data sets like soil health card on micro-nutrients, are disparate and not interoperable, limiting analytics and value creation.
Affordability <ul style="list-style-type: none">•Technological interventions used in precision farming is unaffordable for Indian farmers.

12. ENVIRONMENT

12.1 Key Takeaways from Bonn Climate Meet

Why in news?

The Bonn climate change conference that finished last week was built up as an opportunity for course correction, however, it underperformed.

What is the background of the issue?

- A massive and immediate scale-up in climate action is essential to keep alive any realistic chance of meeting the 1.5 degree or 2 degree Celsius targets.
- Developed and developing countries bickered on issues old and new, and could not even agree on the agenda of one of the meetings till the penultimate day.

What is Global Stocktake (GST)?

- **GST** – Mandated by the 2015 Paris Agreement, GST is an exercise aimed at assessing the progress in the fight against climate change.
- The GST helps in deciding ways and means to enhance global action to bridge the adequacy gap.
- The Paris Agreement says GST must be conducted every 5 years, starting in 2023.
- The actual meat in GST would come in at COP28, the year-ending climate conference, held in Dubai.
- The discussions just produced a short framework on the elements to be included in the stocktake exercise.

What is the tussle between developing and developed countries?

- A bulk of the accumulated greenhouse gas emissions, the reason for global warming, have come from a group of about 40 rich and industrialised countries.
- Such countries are referred to as Annex I countries under the 1992 UN Framework Convention on Climate Change, or UNFCCC.
- This historical responsibility has been the basis for the differentiated burden-sharing on developed and developing countries in the climate change framework.

- **View of developed countries** - Australia issued a statement which downplayed the historical responsibility of the developed countries in causing global warming.
- It argued the emissions happened when there was little understanding on the harm caused by greenhouse gases.
- It pointed out that since 1992, about 57% of the carbon dioxide emissions and 70% of the incremental warming since 1992 due to emissions from carbon dioxide, methane and sulphur dioxide had come from non-Annex I countries.
- Australia said that developed countries would take lead in climate action, however, it did not believe there was an unambiguous debt owed by the developed countries for past actions.
- US said bridging the adequacy gap was not the sole responsibility of the developed nations and that it would not agree to references to pre-2020 commitments in the GST.
- Erasure of historical responsibility is the most sensitive red line for developing countries.

Why the money matters?

- Apart from GST, another mechanism was set up at COP26 in Glasgow in 2021 for climate action.
- **Mitigation Work Programme (MWP)**, is a temporary emergency exercise focused only on increasing emission cuts.
- The Intergovernmental Panel on Climate Change (IPCC) says global emissions have to come down by 43% from 2019 levels by 2030 to keep alive hopes of meeting the 1.5 degree target.
- **Monetary aid** – Most developing countries, including India, have said they would be able to act more if international support in the form of money and technology transfer was made available.
- **Tech transfer** – Developed countries are under an obligation to support the implementation of climate action plans of developing countries through money and tech transfers.
- However, money has been in perennial short supply and more funds are needed for all kinds of other purposes, the total estimated to be running in several trillions of dollars every year.

12.2 South Asia: Climate Migration Hotspot

Why in news?

The World Development Report on Migrants, Refugees, and Societies states, migration will become a necessity to cope with global economic imbalances, diverging demographic trends, and climate change.

What is climate migration?

- Climate migration, a subcategory of environmental migration refers to the migration of people by obligation or by choice, either temporarily or permanently, within a State or across an international border due to sudden or progressive climate change.
- It occurs due to extreme weather events, including floods, heat waves, droughts, and wildfires, as well as slower-moving climate challenges such as rising seas and intensifying water stress.
- South Asia is the world's most impacted area of climate displacement hotspots including the Hindu Kush-Himalaya region, coastal areas, island nations, and deltaic and semi-arid regions of South Asia.

Affected by	Countries
Sea level rise & coastal floods	Bangladesh, India, Pakistan, and Sri Lanka
Glacial melt & temperature rise	Bhutan, Afghanistan and Nepal
Threat of submersion	Small island nations like Maldives

Why South Asia is the climate migration hotspot?

- High population density, poverty, & inadequate infrastructure are the major reasons.
- Climatic reasons like cyclones and earthquakes are prone to this region.
- By 2050, nearly 216 million South Asians could be displaced due to climatic reasons.
- Already, over 9 million internal displacements happened in 2020 in South Asia, making it the region with highest number of new displacements due to climate change.

What are the impacts of Climate displacements?

- **Migration** - Poor economic capabilities reduce the adaptive capacity of communities to climate change events and promote migration.

- **Livelihood** - Climate displacement results in job losses, food insecurity, and an overall overcrowding of resources.
- **Social & Economic Costs** - It creates further migration and incurring other social and economic costs.
 - **Economic costs** - Loss of skilled labour and reduced productivity.
 - **Social costs** - Breakdown of social networks and communities, mental health issues, social unrest, and conflict.
- **Resource crunch** - Climate migration multiplies existing threats like overcrowding and conflicts over resources sharing
- **Over burden on cities** - The rural-urban migration forced by the failure of agriculture, overburdens the cities which already operates at full capacity.
- **Increase in violence** - Climate vulnerability and violence are correlated which could be seen in the conflicted areas.

In 2020, cyclone Amphan alone displaced five million people across South Asia.

In 2015, Nepal's Gorkha earthquake displaced 2.6 million people, and left over 6 lakh homeless.

Over 7.9 million people were displaced by the floods in Pakistan, in 2022.

What should South Asian countries do?

- **Adaptation** - Improve resistance and resilience by introducing sustainable solutions.
- Structural gaps need to be corrected such as making coastal areas resistant and strengthening infrastructure.
- **Comprehensive Policies** - South Asian countries needs comprehensive policies to address climate displacement.
- Governments in the region must develop targeted policies that address the specific needs of climate-displaced communities.
- Policies should also focus on providing alternative livelihood opportunities and social protection programmes.
- **Support** - Adequate international aid to be given to meet the needs of affected communities.

South Asia would have an estimated 50 million climate refugees by 2050.

What are the implications of COP27 on climate displacement?

- COP27 identified 'displacement', 'relocation', and 'migration' as some of the concern areas which would be addressed through 'loss and damage' financing.
- The '[loss and damage](#)' framework was developed at [COP27](#) of UNFCCC, aimed at supporting most impacted countries and viewed as an integral part of climate justice.
- The amount of funding required, and the designation of funders are not determined and remains a concern.
- The climate migrants and climate refugees are yet to find their voice in the global platform.

12.3 Impact of climate change on water bodies

Why in news?

Climate change has severe effects on waterbodies causing decline in freshwater supply, environment degradation and deterioration of water quality for humans and livestock.

What are the importance of water bodies or lakes?

- **Water supply** - Lakes are a major source of freshwater for drinking, irrigation, and industrial use.
- **Recreation** - Lakes are popular for swimming, boating, fishing, and other recreational activities.
- **Employment** - The fishing and tourism industries that rely on lakes provide jobs for millions of people around the world.



- **Water quality** - Lakes help to filter and clean water which helps to protect human health and the environment.
- **Climate regulator** - Lakes help to regulate the climate by storing heat and releasing it slowly.
- This helps to moderate temperatures and reduce the risk of extreme weather events.
- **Biodiversity** - Lakes are home to a wide variety of plants and animals, which play an important role in the ecosystem.
- **Flood prevention** - Lakes can help to prevent flooding by storing excess water during heavy rains.
- **Erosion control** - Lakes can help to control erosion by slowing down the flow of water and depositing sediment.
- **Hydroelectric Power Generation** - Some lakes, especially those formed by dams, are utilized for hydroelectric power generation.
- **Carbon Sink and Nutrient Cycling** - Lakes are significant components of the global carbon cycle.
- They can act as carbon sinks, sequestering carbon dioxide from the atmosphere.
- They play a role in nutrient cycling, influencing the distribution and cycling of important elements like nitrogen.
- **Cultural and Spiritual Significance** - Many lakes hold cultural and spiritual significance for indigenous communities and local populations.

What are the effects of the climate changes on water bodies?

- **World's largest lakes and reservoirs** - Have shrunk more than 50% over the 3 decades.
 - From these water bodies, approximately 600 cubic km of water was lost between 1992 and 2020 which is equivalent to the total water used in the United States for the entire year of 2015.
- **Sedimentation** - Main cause of the decline in the water storage for more than more than half of the reservoirs located in peninsular India.
- Sedimentation has a larger impact than hydro climate variability such as droughts and recovery from droughts.
 - Among the worst affected natural lakes in the country is Ladakh's Tso Moriri.
- **Water consumption** - Unsustainable water consumption in the world's large lake have led to the decreased water levels.
- **Arctic lakes** - Shrunk as a result of a combination of changes in precipitation, runoff, temperature, and PET, which are likely a concurrent result of natural variability and climate change.
- **Humid tropics and high altitudes** - Natural lakes located in humid tropics and high altitudes are also experiencing water shortages.
- **Human activities** - Such as unsustainable consumption of water and increasing temperature and potential evapotranspiration (Loss of water due to both evaporation and transpiration) have led to reduced water levels.

Sedimentation is the process of particles such as sand and stones settling to the bottom of a body of water.

What are the consequences of shrinking lakes?

- Nearly one-quarter of the global population in 2023 will be affected as their livelihood depends on lakes.
- Affects hydroelectricity generation as lakes are important source of hydroelectricity.
- Freshwater decline and environmental degradation.
- Disrupts the water and carbon cycles.
- Reduce the environmental capacity to absorb CO₂ & increase C emissions as lakes are hotspots of carbon cycling.

12.4 Economic Impact of India due to Climate Change

Why in news?

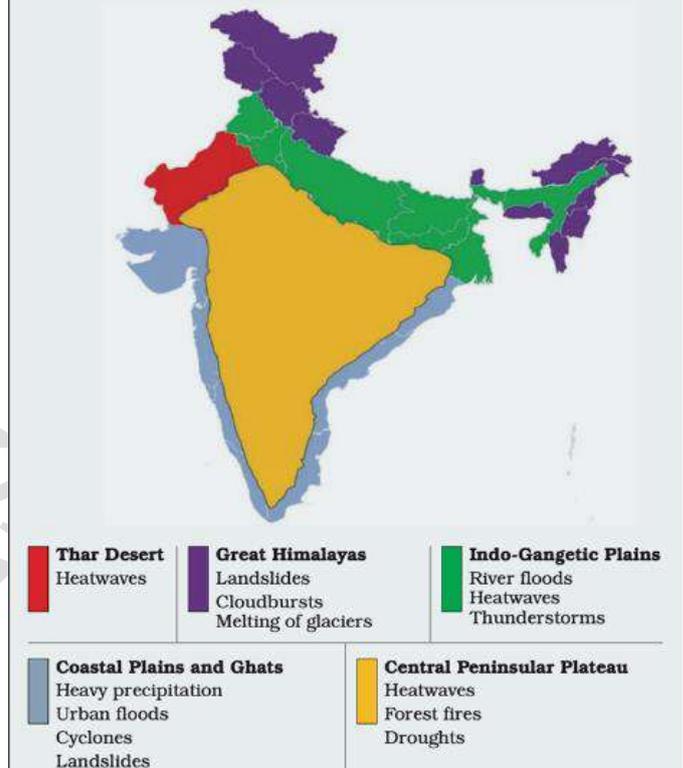
The RBI's report on currency and finance has separate chapter about explaining the macroeconomic effects of climate change in India.

What is economic cost of climate change?

- **Difficult to estimate** - As it depends on a number of factors, including the severity of climate change, the rate of climate change, and the ability of societies to adapt to climate change.
- **Highest in developing countries** - Study by IPCC found that the economic cost of climate change would be highest in developing countries.
- The economic cost of climate change would be highest in developing countries and those that are heavily dependent on agriculture and tourism.
- **Supply and demand of economy** - Climate change can affect both the supply side (productive potential) and the demand side of the economy.
- **Diverse topography** - India is vulnerable to climate change due to its diverse topography, which exposes different regions to varying temperature and precipitation patterns.
- **Extreme weather events** - Floods, droughts, and heat waves, are becoming more frequent and intense due to climate change causing damage to property and infrastructure, and are disrupting the economic activity.
- **Health problems** - Heat-related illnesses, respiratory problems, and waterborne diseases are costing India billions of dollars in healthcare costs.
- **Agriculture** - Rising temperatures and changes in rainfall patterns makes it difficult to grow crops leading to food shortages and higher food prices.
- **Tourism** - [Rising sea levels](#) are threatening coastal resorts, and extreme weather events are making it more difficult for people to travel costing India billions of dollars in lost tourism revenue.

According to Global Climate Risk Index, 2021 India ranks 7th among countries most affected in 2019 by climate change.

Chart II.1: Risks Emanating from Climate Change across Geographical Regions in India



What are the ways to mitigate climate change?

- Promote sustainable farming practices that reduce greenhouse gas emissions.
- Implement effective waste management strategies such as recycling, composting, and reducing landfill waste.
- Enact and enforce policies that support climate-friendly practices.
- Invest in R&D of clean technologies and innovations to reduce emissions and mitigate climate change.
- Collaborate with other countries to address global climate challenges.

12.5 Plastic Pollution: A Glossary of Related Terms

Why in news?

The year 2023 celebrates the 50th anniversary of World Environment Day on June 5th.

What is World Environment Day?

- It has been held annually on June 5, since 1973 by the United Nations Environment Programme (UNEP).
- **June 5** was chosen by UN General Assembly at the 1972 Stockholm Conference on the Human Environment.
- The year 2023 World Environment Day marks its 50th Anniversary.
- This year's theme focuses on solutions to plastic pollution under the campaign **#BeatPlasticPollution**.
- This year's edition is hosted by Côte d'Ivoire (a Western African country) in partnership with Netherlands.

What are the terms related to Plastic Pollution?

- **Plastics** - Derived from the Greek word *plastikos*, meaning capable of being *shaped or moulded*.
- It refers to a wide range of synthetic or semi-synthetic materials that use polymers as a main ingredient with their plasticity.
- Most modern plastics are derived from fossil fuel-based chemicals like natural gas or petroleum.
- Recently, variants made from renewable materials, such as corn or cotton derivatives have also emerged.
- **Commodity plastics** - These refer to the 6 major polymer types which constitute around 70% of global plastic production.
 - Each of the 6 types has different properties.
 - They can be identified by their *resin identification code (RIC)* denoted by symbols found on plastic products.
 - **Resin Identification Code** - RIC shows the consumer which type of plastic resin was used to make the chosen product.
 - The symbol looks similar to recycle symbol but it explicitly does not mean the product can be recycled.
 - The RIC is strictly an identifier of the type of plastic and doesn't address the recycled content or recyclability of the container.
 - The adverse environmental impact of plastic is primarily due to its slow decomposition rate in natural ecosystems.
 - **Decomposition rate** - It refers to the rate at which a material breaks down into its constituent parts through chemical processes.
 - Plastics crumble into smaller particles but do not break down into simpler substances resulting in microplastics.
 - **Microplastics** - Officially defined as plastics *less than 5 millimetres in diameter* and categorised into two.
 - **Primary microplastics** are tiny particles designed for commercial use, such as in cosmetics or textiles.
 - **Secondary microplastics** are particles that are a product of the breakdown of larger plastic items. They are formed due to exposure to environmental factors such as sun radiation or ocean waves.
 - They do not break down into simpler particles but find their way across the world including the food chain.
 - **Toxins** - Microplastics contain a number of toxic chemicals such as BPA which pose severe risks to human health.
 - BPA or **Bisphenol A** is used to harden the plastic, contaminates food and drinks.
 - **Great Pacific Garbage Patch** - It is the largest collection of plastics and microplastics in the *North Pacific Ocean* and is also known as the *trash vortex*.
 - It is located between California and Japan, and formed due to converging ocean currents.
 - The GPGP comprises majorly of *single-use plastics*.
 - **Single-use plastics** - A term which refers to any plastic items which are either designed to be used one time by the consumer before they are thrown away or recycled or used in this way.
 - Many countries, including **India**, have passed legislation to either ban or severely restrict their use.

Plastic Pollution

- The world is being inundated by **plastic** and **plastic pollution** is one of the gravest threats to the planet.
- According to UN data, more than 400 million tonnes of plastic is produced every year worldwide, half of which is single-use plastic.
- Out of which less than 10% is recycled and an estimated 19-23 million tonnes end up in water bodies.
- Plastic clogs our landfills (Land pollution), leaches into the ocean (water pollution) and is combusted into toxic smoke (Air pollution).

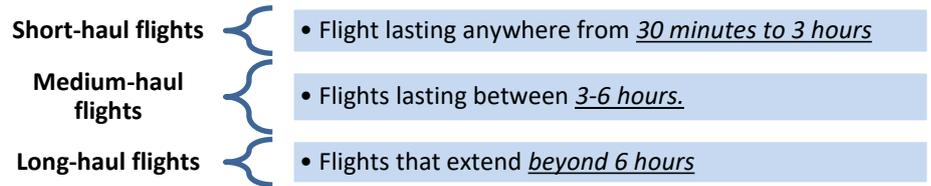
12.6 Banning Short-Haul Domestic Flights

Why in news?

France became the first country in the world to impose a ban on short-haul domestic flights.

Why did the French ban short-haul domestic flights?

- France brought in a new law that bans air travel to destinations that can be covered by up to 2 and a half hour journey by train.
- France banned short domestic flights in favour of train services and to reduce aviation emissions.
- The trend of using private planes has been increasing rapidly in the Europe.
- France, the Netherlands, Austria and Ireland are urging the European Union to strengthen regulations to discourage travel by private jets.



What are the issues with aviation emissions?

- The emissions from planes flying within the boundaries of a country are attributed to that country. But emissions from airlines making international flights are not attributable to any country.
- No country has any responsibility to curtail these emissions.
- These emissions are not covered under the Paris Agreement.

Emission status of the Aviation Industry
<ul style="list-style-type: none">• Air transport, globally, accounts for <u>about 2% of global CO2 emissions</u> every year, and <u>less than 2% of greenhouse gas emissions</u>.• According to UN Climate Change, if the non-CO2 emissions, like water vapour, are accounted for, the airline industry would be responsible for causing almost <u>5% of historical global warming</u>.• A European transport campaign group has estimated that private jets were 5 to 14 times more polluting, per passenger, than commercial planes, and 50 times more polluting than trains.

Is there any offset mechanism so far?

- In 2016, the International Civil Aviation Organisation (ICAO) introduced an offset mechanism called Carbon Offsetting and Reduction Scheme for International Aviation ([CORSIA](#)).
- The offset plan CORSIA is supposed to run from 2021 to 2035.
- CORSIA does not deal with total emissions and only seeks to offset emissions that are over and above 2020 levels.
- The mechanism ensures that the excess emission is compensated for by the airline industry through investment in carbon saving projects elsewhere.

What are the other methods to reduce carbon emissions?

- Biofuels and hydrogen fuel cells have been tried as alternate fuels.
- Solar powered planes have also made trips.
- Unlike road or rail travel, aviation does not have viable technology alternatives for shifting to cleaner fuels.
- These alternative fuels for flying large commercial airliners is still unviable.

12.7 Carbon Border Adjustment Mechanism (CBAM)

Why in news?

The talks on the Carbon Border Adjustment Mechanism (CBAM) at the WTO's dispute settlement body has brought to the forefront the inter-linkages between trade and the environment.

What is CBAM?

- The [Carbon Border Adjustment Mechanism](#) (CBAM) is an initiative of European Union (EU) to prevent carbon leakage from extremely carbon intensive imports.
- Under CBAM, duties will be imposed on imported goods based on the carbon expended in producing them.

- Under the CBAM, imports of certain carbon-intensive products, will have to bear the same economic costs borne by EU producers under the ETS.
 - Cement, electricity, iron & steel, fertilizers, aluminium, and hydrogen are few carbon-intensive sectors to be covered under CBAM.
- The price to be paid will be linked to the weekly average of the emissions priced under the ETS.
- However, where a carbon price has been explicitly paid for the imported products in their country of origin, a reduction can be claimed.

Emissions Trading System (ETS)

In 2005, the EU adopted the Emissions Trading System (ETS), a market-based mechanism that aims at reducing greenhouse gas (GHG) emissions by allowing bodies emitting GHG to buy and sell these emissions amongst themselves.

Why EU wants CBAM?

- The EU has stringent emission control mechanisms like Emissions Trading System (ETS) for its domestic industries.
- The EU's concern is that emissions embedded in products imported from other countries is not be priced in a similar way and would put its industries at a disadvantage.
- To tackle this, the impacted industries had so far been receiving free allowances or permits under the ETS.
- The EU also apprehends the phenomenon of 'carbon leakage' due to the application of ETS.
- European firms operating in carbon-intensive sectors might possibly shift to those countries that have less stringent GHG emission norms. CBAM is aimed at levelling the playing field for the EU industries.

Why CBAM is not in line with WTO principles?

- Non-discrimination is a cornerstone principle of WTO law. Countries are required to accord equal treatment
 - To 'like' products irrespective of their country of origin (MFN treatment) and
 - To treat foreign-made 'like' products as they treat domestic ones (national treatment principle).
- **Inconsistency** - The CBAM violates WTO law for discriminating between EU and foreign products covered by CBAM based on the embedded emissions.
- Also the question of whether carbon-intensive products to which the CBAM applies are 'like' arises.
- The CBAM does not consider 'implicit' carbon borne by products originating in certain countries.
- **Way out** - The discrimination of CBAM could be justified under the General Exceptions clause given in Article XX of the General Agreement on Tariffs and Trade (GATT).
- Under Article XX, measures taken by countries that otherwise violate GATT obligations are permitted if,
 - They fall under one of the listed policy grounds, and
 - They satisfy the requirements of the introductory clause of Article XX, known as the chapeau.
- CBAM would fall under the 'conservation of exhaustible natural resources', one of the listed policy grounds in Article XX.

What are India's concern towards CBAM?

- India has criticized CBAM as being protectionist and discriminatory policy.
- The EU's CBAM, has spooked India that it will cripple the export of its carbon-intensive products to the EU.
- CBAM is an important issue in the ongoing India-EU free trade agreement negotiations.

To know more about India's Concerns on CBAM, [Click here](#).

12.8 Arctic Sea Ice

Why in news?

A recent study says that the loss of Arctic sea ice is inevitable in the decades ahead, even if the world sharply reduces carbon emissions.

What is Arctic sea ice?

- They are the massive sheets of ice that pad the Arctic region.

- During winter, the sea ice envelops most of the Arctic Ocean and in summer, due to longer periods of exposure to sunlight, a portion of it melts.
- Sea ice normally melts and is at its thinnest in mid-September and the ice reaches its zenith in March.

What is happening to Arctic sea ice?

- The Arctic sea ice is decreasing as acknowledged in several reports of the Intergovernmental Panel on Climate Change (IPCC).
- **Ice-free arctic** - If the global emissions drive temperature beyond 4.5°C, then the Arctic is ice-free by 2081-2100. Under this assumption, the world will see its first 'sea-ice free summer' before 2050.
- **Polar jet streams** - They are currents of air that form when warm and cold air meet.
- The diminished sea ice while warming the Arctic also leads to a weakening of the polar jet streams.
- **Western disturbances** - This weakening has been linked to rising temperatures and heatwaves in Europe as well as unseasonal showers in northwest India.

What does the new study say?

- As much as 90% of the ice-melting was due to human-instigated, or anthropogenic factors and the rest of it (10%) is caused by natural variability.
- **Above 4.5°C** - It turned out that there were also likely to be ice-free Augusts and Octobers by 2080 in the emission scenarios where temperatures rose above 4.5°C.
- **Below 2°C** - Even if the temperature-rise was restricted to say 1.5°C or 2°C, as envisaged in the Paris Agreement, there is no scenario under which the Arctic sea ice can be saved in summer.

The rate of arctic ice loss has been nearly 13% every year, ever since satellites began to monitor arctic.

Why is the Arctic sea ice important?

- Arctic sea ice play a major role in influencing global climate and the rise and fall in Arctic sea temperatures.
- **Albedo effect** - Sea ice is light-coloured and therefore has more albedo.
- Thus sea ice plays a vital role in keeping Polar Regions cool and maintaining the earth's energy balance.
- **Natural barrier** - Sea ice also keeps the air cool by forming a barrier between the cold air above and the relatively warmer water below.
- **Feedback Loop** - As the amount of sea ice decreases, the Arctic region's cooling effect is reduced leading to 'feedback loop'.
- More absorption of solar energy causes ocean warming, which leads to more loss of sea ice and further warming.
- **Biodiversity** - Changes in sea ice can affect biodiversity and impact mammals such as polar bears and walruses.
- These mammals rely on the presence of sea ice for hunting, breeding, and migrating.
- **Arctic lifestyle** - The reduction in ice cover also affects the traditional hunting lifestyle of indigenous Arctic populations such as the Yup'ik, Iñupiat, and Inuit.
- **New pathways** - Reduced ice can open commercial and economic opportunities provoking global competition.
- Reduced ice opens up shipping lanes and increases access to natural resources in the Arctic region.

13. SCIENCE & TECHNOLOGY

13.1 ISRO's new NavIC satellite

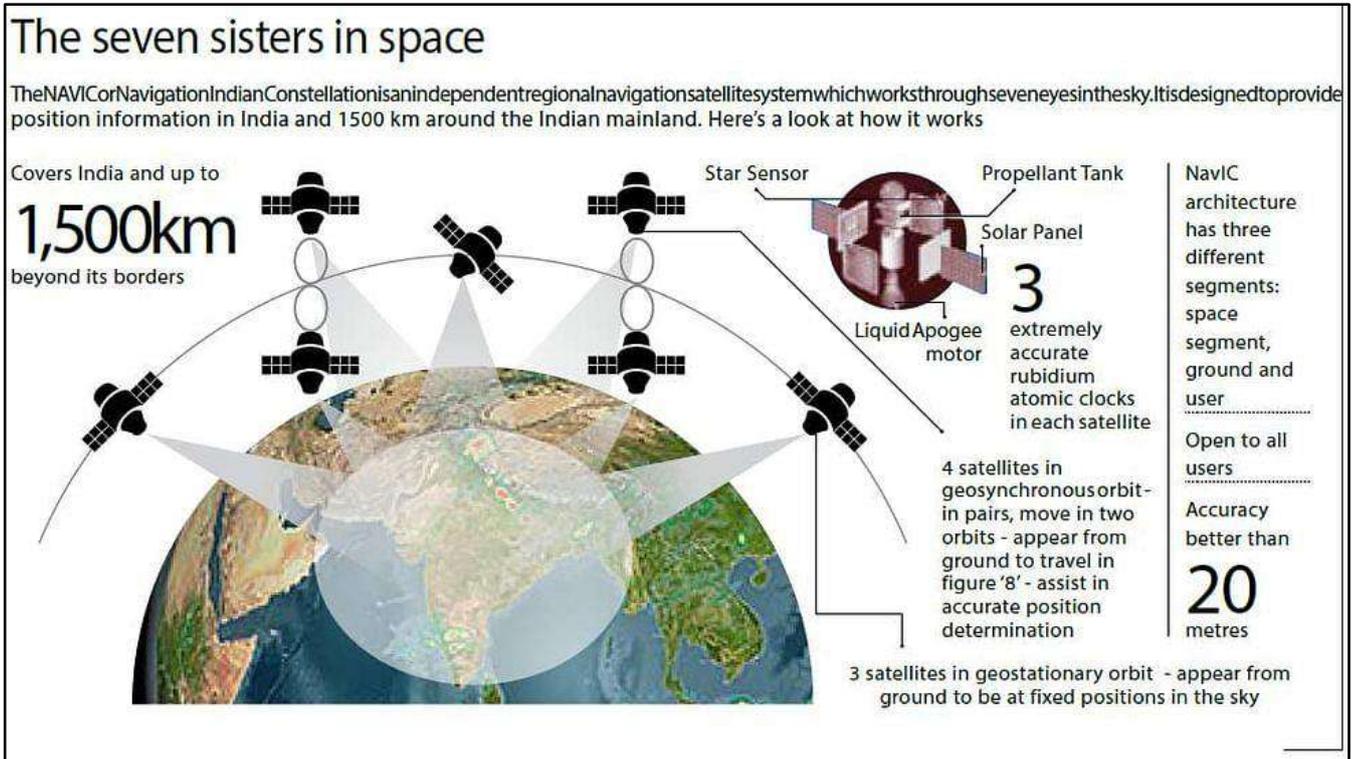
Why in news?

The Indian Space Research Organisation (ISRO) launched the first of the second-generation satellites for its navigation constellation successfully.

What is NavIC?

- NavIC (Navigation with Indian Constellation) is a regional navigation satellite system of India.

- It is erstwhile known as the **Indian Regional Navigation Satellite System (IRNSS)**.
- NavIC is designed with a constellation of **7 satellites**, all launched by PSLV rockets - 3 satellites of the constellation are placed in **geostationary orbit** and the other 4 are placed in inclined **geosynchronous orbit**.
- NavIC offers two services: **Standard Position Service (SPS)** for civilian users and **Restricted Service (RS)** for strategic users.
- NavIC satellites will broadcast SPS signals in L1, L5 and S bands after the addition of **NVS-01**.
- RS signals will be broadcasted in L5 and S bands.



What are the current issues with IRNSS constellation?

- **Atomic clock** - Satellite-based positioning system determines the location of objects by using the atomic clocks on board.
- The atomic clocks accurately measure the time it takes for a signal to travel to and back from it.
- In 2018, ISRO started the launch of the replacement satellites after their onboard atomic clock failed and it stopped providing accurate location data.
- **Mission Life** - IRNSS-1A which was launched into orbit in 2013, is almost defunct.
- All the 3 oldest satellites in the constellation are close to the end of their 10-year mission lives.
- At least three new satellites must be put into orbit to keep the seven-satellite constellation fully functional.
- **Signal Band** - The L1 frequency is among the most commonly used in the Global Positioning System (GPS).
- Earlier IRNSS used only L5 and S frequencies, this limits the interoperability with other global navigation satellite system (GNSS).

What is second generation satellites?

- They are **replacement satellite for the Indian Regional Navigation Satellite System**.
- The second generation satellites will replace satellites located at a **geosynchronous orbit** with additional features.
- **NVS-01** - It is the first of the second-generation satellites envisaged for NavIC services.
- NVS-01 was launched by a Geosynchronous Satellite Launch Vehicle (GSLV) rocket.

What's new in the second-generation NavIC satellite?

- **Mission Life** - The second-generation satellites will also have a longer mission life of more than 12 years.

- **New band (L1)** - The NVS series incorporates L1 band signals additionally to increase the interoperability with other satellite-based global navigation systems widen the services.
- It will increase the use of NavIC in wearable devices and personal trackers that use low-power, single-frequency chips.
- **Atomic clock** - For the first time, an indigenous atomic clock will be flown in NVS-01.
- The satellite will have a Rubidium atomic clock onboard, indigenously developed by Space Application Centre-Ahmedabad.

What practical purpose does the NavIC constellation serve for users?

- NavIC is in use for projects like public vehicle safety, power grid synchronisation, real-time train information systems, and fishermen's safety.
- Initiatives such as common alert protocol based emergency warning and unmanned aerial vehicles are in the process of adopting NavIC system.
- The Ministry of Electronics and IT urging smartphone companies to make their handsets NavIC compatible.

Global Satellite-Based Navigation Systems

- The American GPS
- The Russian GLONASS
- The European Galileo
- The Chinese Beidou

What is the advantage of having a regional navigation system?

- Japan has a 4-satellite system that can augment GPS signals over the country, similar to India's GAGAN.
- India is the only country that has a regional satellite-based navigation system.
- **Accuracy** - GPS signals are accurate up to around 20 metres whereas NavIC open signals will be accurate up to 5 metres and restricted signals will be even more accurate when fully operational.
- **Coverage** - NavIC provides coverage over the Indian landmass and up to a radius of 1,500 km around it.
- **Consistency** - NavIC uses satellites in high geo-stationary orbit which enables the satellite to look over the same region on Earth always.
- **Penetration** - NavIC signals come to India at a 90-degree angle, making it easier for them to reach devices located even in congested areas, dense forests, or mountains.

13.2 India joins Artemis Accord

Why in news?

India became the 27th signatory to the American-led Artemis Accords.

What are Artemis Accords?

- The **US** established the Artemis Accords together with 7 other founding member nations in 2020 to return humans to the moon by 2025.
- The Artemis Accords reinforce and implement key obligations in the 1967 Outer Space Treaty.
- These Accords are a **non-binding** set of principles designed to guide civil space exploration cooperation among nations participating in the agency's 21st century lunar exploration plans.
- It currently has 27 signatories including India.
- Artemis mirrors a Chinese-Russian plan for an 'International Lunar Research Station' (ILRS).

What is done under Artemis Accords?

The Artemis programme this time plans for permanent settlements on the Moon.

- The project plan includes
 - a base on the lunar surface
 - multiple spacecraft to ferry humans and cargo
 - a small orbiting space station called the 'Lunar Gateway'
 - a constellation of satellites to help with navigation and communication
- The Artemis Accords was created by the U.S to act as a soft-law alternative to the Moon Agreement, which limits resource extraction in celestial bodies.

- If Artemis Programme succeed in permanent settlement in lunar surface, resource extraction will be limited to lunar surface.
- A key provision in the Artemis Accords allows for actors to extract and utilise space resources.

What is the Moon Agreement of 1979?

- The Moon Agreement of 1979 is directed towards the use of the Moon and other celestial bodies.
- It limits the scope of exploitation of resources from these celestial bodies and establishes that the moon and other celestial bodies are 'the province of all mankind'.
- It declares that these regions of space must only be for peaceful purposes, with no state allowed to establish military bases or place weapons on celestial bodies.
- - Despite being instrumental in the drafting of the Moon Agreement, the United States did not ratify it.
- India is a signatory to the Moon Agreement, but is yet to ratify it.

What is it that India seeks to gain out of Artemis?

- **Gaganyaan** - Parties to the Accords gain greatly from the exchange of information and gain access to NASA's Artemis programme. This shared information would greatly help India's own Gaganyaan mission.
- **ISRO** - NASA and ISRO have agreed to a joint mission to the International Space Station (ISS) in 2024.
- This opens avenues for knowledge sharing, joint research, and technological exchange between the two space agencies.
- Earlier, ISRO and NASA collaborated in the development of NISAR Mission.
- **Bilateral ties** - The ties between India and the U.S. have been on an upswing and this accord improves bilateral space cooperation between them.
- India in its new space policy allows private players to mine any 'space resource,' which presumably includes the Moon.
- **Economic potential** - It allows Indian companies and industries to participate in the global space economy and access new markets.
- **Space industry** - Increased investment in the space sector drives job creation, research and development and the growth of India's space industry.
- **Collaboration** - India can collaborate and gain knowledge from other Artemis signatories.

What is the way forward?

- India has much work to do to make the most of the Artemis programme.
- It has to overcome domestic resistance to collaboration with other space agencies and has to enable its private sector to work with other Artemis members, and develop legislation that encourages space activities.

13.3 India's new guidelines on Genetically Modified Insects

Why in news?

In April 2023, the Department of Biotechnology (DBT) issued the 'Guidelines for Genetically Engineered (GE) Insects'.

What are Genetically Modified insects?

- A genetically modified insect is any insect whose genetic material has been altered using genetic engineering techniques. Such insects are also called Genetically Engineered insects (GE insects).
- These techniques help achieve the desired physiological traits or the production of desired biological products.
- **Control** - GE organisms or cells and hazardous microorganisms and products thereof are regulated as per '**Rules 1989**' under the Environment (Protection) Act of 1986.

What are the significance of GE insects?

- Usage of GE insects uplifts the standard of living by reducing disease burden, enables food security and conserves the environment.
- **Economic value** - India's bioeconomy contributes 2.6% to the GDP.

The bioeconomy is the using of renewable biological resources from land and sea, like crops, forests, fish, animals and micro-organisms to produce food, materials and energy.

- It is expected to be closer to 5% by 2030 as envisaged in the Department of Biotechnology's '*Bioeconomy Report 2022*' report.
- **Applications**
 - Vector management in human and livestock health;
 - Management of major crop insect pests;
 - Maintenance and improvement of human health and the environment through a reduction in the use of chemicals;
 - Production of proteins for healthcare purposes;
 - Genetic improvement of beneficial insects like predators, parasitoids, pollinators (e.g. honey bee) or productive insects (e.g. silkworm, lac insect).

What is the guidelines about?

- The Department of Biotechnology (DBT) functions under Ministry of Science and Technology (MoST) is the nodal agency and promoter of biotechnology in India.
- DBT issued the 'Guidelines for Genetically Engineered Insects'.
- The guidelines provide procedural roadmaps for those interested in creating GE insects.
- The guidelines have been harmonised to the guidance from the World Health Organisation on GE mosquitoes.

What are the issues with the guidelines?

- **Uncertainty of purpose** - The guidelines only provide regulatory procedures for R&D on insects with some beneficial applications.
- The guidelines don't specify the purposes for which GE insects may be approved in India or how the DBT envisions their use.
- **Uncertainty for researchers** - The guidelines are applicable only to research and not to confined trials or deployment. There is no criteria to approve the deployment of GE insects
- **Categorising** - The guidelines define GE insects by their risk group and not by the end product.
- **Uncertainty of ambit** - The guidelines offer standard operating procedures for GE mosquitoes, crop pests, and beneficial insects.
- There is a lack of clarity about the insects and the modifications to them that are deemed 'beneficial'.
- **Ill effects** - Genetic engineering can also be used to unintentionally generate malicious products.
- The new guidelines don't sufficiently account for more dangerous possibilities.

What could be done to improve India's bioeconomy?

- **Funding** - The ambitious leap of \$220 billion in 8 years as envisioned in 'Bioeconomy Report 2022 report' will require aggressive investment and policy support.
- Efforts are also needed to attract private funding in biotechnology research and development.
- **Robust Policy** - biotechnology policies also need to be aligned to the economic goals set out in the Bioeconomy report.
- **Deployment** - GE insects can't be recalled once deployed, so wider community engagement and monitoring of the impact of GE will be required.
- **Non-consumption GE insects** - GE insects for human/animal consumption require stringent checks but GE insects used for silk or lac production and other non-consumption do not require such checks.
- **Precise Guidelines** - Clear cut definition and ambit to be mentioned in guidelines to avoid any room for doubt.

13.4 Concerns over Neuralink Chip

Why in news?

Elon Musk's company Neuralink gets the U.S. Food and Drug Administration's (FDA) approval for study of brain implants in humans.

What is Neuralink?

- [Neuralink](#) is brain-implant Company, co-founded by Elon Musk.
- Neuralink is making a Class III medical device known as a brain-computer interface (BCI).
- The device connects the brain to an external computer via a Bluetooth signal, enabling continuous communication back and forth.
- The device itself is a coin-sized unit called a Link.
- It's implanted within a small disk-shaped cut-out in the skull using a precision surgical robot.
- The robot splices a thousand tiny threads from the Link to certain neurons in the brain.
- Each thread is about a quarter the diameter of a human hair.

What are the benefits of Neuralink?

- If the Neuralink successfully works in humans, it would have wide range of benefits.
- The device could enable precise control of prosthetic limbs, giving amputees natural motor skills.
- It could revolutionise treatment for conditions such as Parkinson's disease, epilepsy, and spinal cord injuries.
- It can also be used in the treatment of obesity, autism, depression, schizophrenia and tinnitus.

What were the FDA's concerns over clinical human trials of Neuralink?

- Neuralink received FDA approval for its first human clinical trial in May 2023.
- The FDA had also raised a list of concerns that needed to be resolved before human trials could commence.
- **Safe surgery** - A precision robot known as Implant/r1 performs the surgical procedure to implant the Neuralink BCI.
- This robot should be reliably and safely implant and remove the Neuralink BCI without damaging surrounding brain tissue.
- **Harmful side effects** - The implanted Neuralink BCI must not unintentionally influence other brain functions and should not cause any unwanted side effects such as seizures, headaches, mood changes, or cognitive impairment.
- **Safe power supply** - Overheating lithium-ion batteries can pose great risk to BCI users.
- **Wire migration** - The Link consists of a chip with very thin wire electrodes that connect to neurons in the brain. There is a risk of wire migration over time due to natural movement, inflammation, or scar tissue formation.
- **Implant removal** - The safety and difficulty of removal of implants.
- **Data privacy** - Safeguards of the data collected against being hacked, manipulated or otherwise misused.

What is Neuralink's reply to the FDA's concerns?

- Extensive animal studies have been conducted by Neuralink.
- It provides evidence that its wires did not migrate over time, or cause any adverse effects on the brain.
- The company has come up with a method for tracking and adjusting the position of the wires to overcome wire migration.
- Neuralink specially designed battery to evaluate its performance, durability and bio-compatibility.

Class III medical device

- The Food and Drug Administration (FDA) has established classifications for different generic types of devices.
- Each of these generic types of devices is assigned to one of three regulatory classes - Class I, Class II and Class III.
 - Class I General Controls
 - Class II General Controls and Special Controls
 - Class III General Controls and Premarket Approval
- It is assigned based on the level of control necessary to assure the safety and effectiveness of the device.
- Class III includes those with the greatest risk like pacemakers and breast implants.
- These devices usually sustain or support life, are implanted, or present potential unreasonable risk of illness or injury.
- For Class III devices, a premarket approval application (PMA) is required.

What is the way ahead?

- Elon Musk claims that Neuralink could augment human intelligence by creating an on-demand connection with artificial intelligence systems.
 - For example, improved cognition through enhanced memory, and improved learning and problem-solving skills.
- Neuralink with at this growth pace needs regulation. The cutting edge technology must not be released to the public until proven to be safe and this requires exhaustive testing.

13.5 India and Graphene

Why in news?

India needs to catch up in the area of graphene to be among the leaders in AI and a potential challenger in quantum computing.

What is graphene?

- Graphene is an allotrope of carbon consisting of a single layer of atoms arranged in a hexagonal lattice nanostructure.
- Graphene was discovered in 2004 for which the scientists received the Nobel Prize in Physics in 2010.
- It is the world's thinnest, strongest, and most conductive material of both electricity and heat.
- **Properties** - It is 200 times stronger than steel but 6 times lighter.
- It is almost perfectly transparent as it absorbs only 2% of light.
- It is impermeable to gases, even those as light as hydrogen and helium.
- It has the potential to absorb and dissipate electromagnetic waves.
- It is highly sensitive to environmental changes.

What are the applications of Graphene?

- Graphene in itself has huge potential to revolutionise electricity, conductivity, energy generation, batteries, sensors and more.
- Graphene composites are used in aerospace, automotive, sports equipment and construction.
- It is used for high-performance batteries and super-capacitors, touchscreens, and conductive inks.
- Graphene-based sensors are used for environmental monitoring, healthcare and wearable devices.
- Graphene oxide membranes are used for water purification and desalination.
- Graphene has an attractive potential in defence and aerospace as a promising material for armour and ballistic protection due to its exceptional strength.

What are the global trends towards graphene?

- Over 300 companies are producing graphene or its derivatives.
- **China & Brazil** - Global leaders in the commercial production of graphene.
- China, the U.S., the U.K., Japan, South Korea, Russia, and Singapore - Leading countries in graphene research.
- Europe has set up the Graphene Flagship, with a budget of 1 billion Euro in 2013.
- In 2018, China filed 218 graphene-related patent while the other leading countries together filed 79.
- India had eight graphene-related patent filings.

As per a report, at least one graphene-enhanced product was launched every week in 2022.

How is India's progress in graphene industry?

- India produces about one-twentieth of graphene products compared to China and one-third compared to Brazil.
- Some start-ups and foreign subsidiaries have started graphene or graphene derivatives in India.
- The India Innovation Centre for Graphene in Kerala is being setup and implemented by the Digital University Kerala in partnership with Tata Steel.

- Indian companies have patented for a technology for graphene-based ultra-capacitors and developed applications of graphene-based nanotubes.

What should India do to progress in graphene industry?

- India missed the semiconductor bus in the mid-1990s, now it has to step on the graphene.
- Centre needs to become the nodal point to spur large-scale innovation activity around graphene.
- A nodal Ministry needs to be entrusted with the responsibility of 'National Graphene Mission'.
- India needs to be among the leaders in graphene to get benefitted the most from the industry and to excel in AI and quantum computing.

13.6 Higgs-Boson Decay

Why in news?

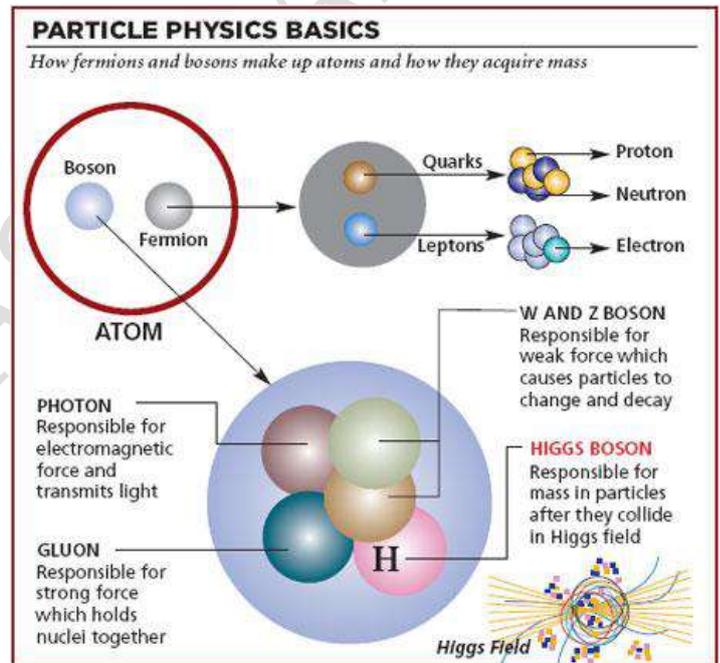
Physicists detected a Higgs boson decaying into a Z boson particle and a photon in the [Large Hadron Collider](#) (LHC) at CERN.

What is the Higgs boson?

- The Higgs boson is the fundamental force-carrying particle of the Higgs field, which is responsible for granting other particles their mass.
- Known as 'God's Particle', it was first discovered by the ATLAS and CMS detectors in 2012.
- **Properties** - The Higgs boson has mass but is chargeless.
- It has a mass of 125 billion electron volts.
- It has zero spin, making it the only elementary particle with no spin.

How mass of other particles is related to Higgs Boson?

- The mass of the subatomic particle depends on the particle's interaction with the Higgs boson.
- The stronger the interaction the more the mass it has.
- **Mass** - Photons (particles of light) have no mass because they don't interact with Higgs bosons.
- The Higgs boson has a mass of 125 billion electron volts which is 130 times more massive than a proton.
- A Higgs boson's mass is greater than that of protons or neutrons because a Higgs boson can interact with another Higgs boson.



How universe could be studied using Higgs boson particles?

- **Universe** - Higgs bosons can tell us a lot about the universe on studying two factors -
 - Understanding the properties of Higgs bosons
 - How strongly each type of atomic particle couples to Higgs bosons.
- **Virtual particles** - According to quantum field theory, space at the subatomic level is filled with virtual particles.
- They are particles that quickly pop in and out of existence which can't be detected directly but their effects sometimes linger.

What is the Higgs Boson decay?

- The LHC creates a Higgs boson by accelerating billions of highly energetic protons into a head-on collision.
- This releases a tremendous amount of energy that condenses into different particles.

- When a Higgs boson is created in LLHC, it has a brief interaction with virtual particles that creates a Z boson and a photon.
- The Z boson is also unstable and decays to two muons some 3% of the time.

What is the Standard Model?

- The Standard Model of particle physics explains how the basic building blocks of matter interact, governed by 4 fundamental forces.
- The Standard Model is an established and well-tested theory of particle physics.
- It successfully explained how these particles and 3 of the forces are related to each other.
- But it could not explain dark energy or the warping of space and time or how neutrinos have mass.
- The Standard Model theory states that a Higgs boson will decay to a Z boson and a photon 0.1% of the time if its mass is 125 billion eV/c².

Weak force, Strong force, Gravitational force and Electromagnetic force are the 4 Fundamental forces.

How significant is the decay?

- According to the Standard Model, the LHC needed to have created at least 1,000 Higgs bosons to have been able to spot one of them decaying to a Z boson and a photon.
- The LHC would have had to create at least 30,000 Higgs bosons to observe the decay just once to spot a pair of muons plus a photon created at the same time.
- Testing Standard models predictions as precisely as possible is a way to find whether there are any cracks in the Model.
- Some theories predict a higher rate of decay through this pathway.
- The experimental proof of this can validate new theories of physics and open new realm of science.

Large Hadron Collider

- The Large Hadron Collider (LHC) is the world's largest and most powerful particle accelerator.
- Started in 2008, it is located in the CERN's accelerator complex.
- It consists of a 27-kilometre ring in which two high-energy particle beams travelling in opposite directions are made to collide.
- It has 4 particle detectors - ATLAS, CMS, ALICE and LHCb at 4 colliding locations around the accelerator ring.

13.7 AI in Healthcare

Why in news?

At a time of mounting healthcare challenges, Artificial intelligence (AI) is adding new capabilities to the health sector with astonishing speed.

What is Artificial intelligence (AI)?

- Artificial intelligence (AI) – It is when computers and other machines mimic human cognition, and are capable of learning, thinking, and making decisions or taking actions.
- AI in healthcare is an umbrella term to describe the application of machine learning (ML) algorithms and other cognitive technologies in medical settings.

As per the Indian AI Healthcare Market 2019-2025 report, AI in the Indian healthcare industry is estimated to grow at a CAGR of 50.9% during the forecast period.

What is the scenario of AI healthcare in India?

- India is one of the few developing countries leading the way on AI in health.
- By 2025, India would invest 11.78 billion USD in India's AI in the primary sector, which will enhance the country's GDP by 1 trillion USD by 2035.
- **Present case** - Indian start-ups are continuing to refine and prioritise increased personalised medical care by using AI tools.

- Some of the AI healthcare start-ups in India that are reshaping the industry are:
 1. **HealthifyMe** - Harnesses AI to provide personalised diet and fitness information and coaching.
 2. **Tricog** - Offer virtual cardiology services to distant clinics.
 3. **Dozee** - Contactless health monitors that enable early detection of any health deterioration.
 4. **Niramai** - Early-stage detection of breast cancer.

How AI is leveraging healthcare systems?

- **Diagnosis** - AI can improve diagnosis and risk stratification.
- The large and untapped potential of AI is it can diagnose a range of diseases at scale and earlier than clinicians.
- AI can suggest early interventions for those whose genetics, environment or behaviours place them at greater risk.

- **Infectious disease intelligence** - Climate change and human migration increases the risk of future occurrences of infectious disease.

- AI-driven systems can predict outbreaks and map their spread and deliver customised mitigation suggestions.

- For example, by testing wastewater, analysing web traffic and modelling mosquito movement patterns can help map the spread.

- **Clinical trial optimisation** - Clinical trials are expensive, time-consuming and under representation of underserved groups and women.

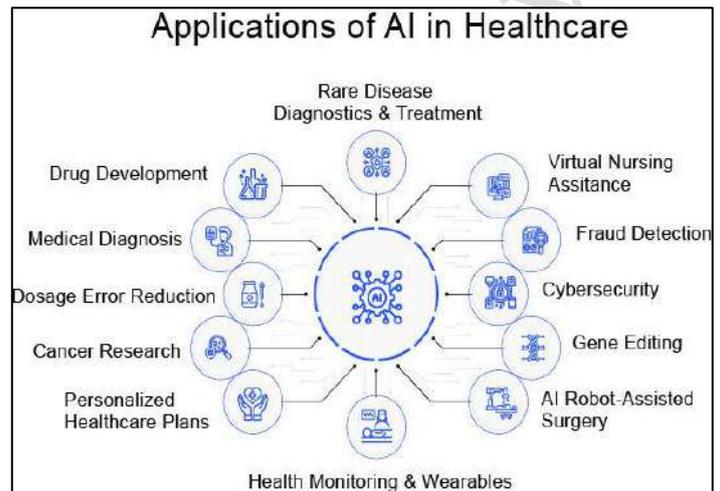
- AI can select optimal trial sites, recruit and retain participants and create more representative synthetic data.

- New therapies and treatments that work optimally across demographic groups will be faster in time to market through AI optimised clinical trials.

- **Others** - AI also offers the promise of greater transparency into the medical supply chain.

- AI tools based on deep learning offers insights about the mechanisms underlying disease.

- Identify the patient subgroups that is likely to respond to a given treatment and discover new therapeutic assets.



What are the challenges for AI in healthcare?

- There are 4 major barriers to leverage healthcare system through AI.
 1. Insufficient high-quality data.
 2. Low doctor trust of AI solutions.
 3. Over-emphasis on flashy pilots at the expense of easily scalable solutions.
 4. Inadequate technological infrastructure, especially in low- and middle-income countries.

What should be done to overcome these challenges?

- **Stakeholders** – All stakeholders should come together to ensure AI in healthcare is ethical, responsible and equitable resulting in improved outcomes for all.
- Stakeholders from across healthcare, government and beyond must ensure that algorithms are developed and work *responsibly and transparently*.
- **Data privacy** – Governments must strengthen data privacy laws regulating the use of anonymised patient data to train algorithms.
- **Data ownership** – They must also help *codify data ownership* and security policies to encourage interoperability of data across borders and corporate walls.
- Governments must incentivise *private investment* in AI and allocate funds to scale solutions that are already working elsewhere.
- **Partnerships** – The partnerships between countries must also be cultivated to ensure AI innovations accessible across borders, especially reaches low and middle income countries.

14. INTERNAL SECURITY

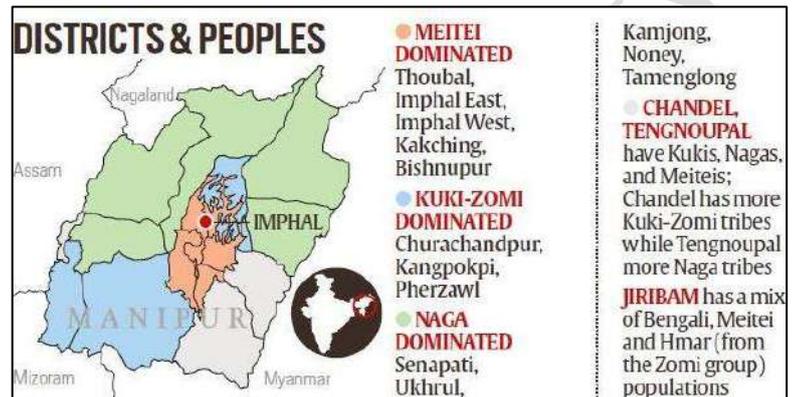
14.1 The History of Insurgency in Manipur

Why in news?

A battle is raged between Manipuri commandos and Kuki-Zomi insurgent groups killing many insurgents amidst rising protests and spurts of violence in Manipur.

What is the history of conflict in Manipur?

- Manipur has been in the cross-currents of India's oldest insurgent movements.
- Naga** - The Naga movement (1950s) is the country's longest-running insurgency which fights for the Greater Nagaland or Nagalim.
- Kuki** - Kuki groups also have fought the Indian government for an 'independent Kuki homeland', spread across Manipur.
- The Kuki insurgency gained momentum after ethnic clashes with the Nagas of Manipur in the early 1990s.
- Meitei** - The Meiteis in Manipur also opposed the merger agreement between the Manipuri king and the Indian government (1949).
- In 1964, the United National Liberation Front (UNLF), a meitei insurgent group, was formed, demanding secession from India.
- Subsequently, numerous Meitei insurgent (valley insurgent) groups like the People's Revolutionary Party of Kangleipak (PREPAK) and the People's Liberation Army (PLA) came into being.



What are the major ethnic conflicts in Manipur?

- Naga-Kuki clash** - Land that the Kukis claim to be their 'homeland' in the Manipur hills overlaps with the Greater Nagaland or Nagalim.
- The NSCN-IM entered a ceasefire agreement with the Indian government only in 1997.
- Kuki-Zomi** - In 1993, a massacre of Kukis by the NSCN-IM left thousands of Kukis homeless.
- The Kuki-Zomi tribes organised various armed groups as a reaction to this aggression of Nagas.
- Meiteis and Meitei Pangals (Muslims)** - Similar clashes were taking place between them which led to the formation of the Islamist group People's United Liberation Front (no longer active).

Kukiland – An imagined country spreading across the Kuki-Zomi inhabited areas of India, Myanmar & Bangladesh.

What is the Kuki-Zomi movement?

- The Kuki-Zomi movement started as defence against aggression by other groups.
- It later transformed into a call for Kukiland and later diluted to simply a call for a separate state.
- The United National Liberation Front (UNLF) is considered the mother of all Meitei insurgent groups.
- Out of the valley insurgent groups, the UNLF remained the most powerful till recently.
- Few other powerful groups are the Kangleipak Communist Party (KCP) and the Kanglei Yawol Kanna Lup (KYKL).
- These groups emerged over time and now function out of camps set up in Burmese territory.
- Over the years the power of the valley groups has waned, even UNLF is at its weakest.
- Amongst the Naga groups, the NSCN-IM remains the most prominent group.

How influential are these insurgent groups in politics?

- The insurgent groups are intricately woven into the daily life in Manipur.
- The valley groups, in particular the UNLF, have from time to time called for strikes.
- They have rules as 'moral codes' such as ban on Hindi movies and music, ban on Indian clothing, ban on alcohol and regulations on what can be shown in Meitei movies, etc.
- They also levy 'taxes' on the public.
- Cutting across party lines, candidates stand for elections with insurgent backing.
- The groups also dictate to the voters who should win and influence the voters.

What was the Government's reaction towards these clashes?

- The Indian government enacted the ***Armed Forces Special Powers Act (AFSPA)*** in 1958 in reaction to the Naga separatist activity in Nagaland and parts of Manipur.
- When the valley movement gained momentum, the AFSPA act was extended to the entire state.
- In the 1980s, Manipur was declared a disturbed area.
- A tripartite ***Suspension of Operation (SoO) agreement*** between the Centre, the state and the Kuki-Zomi groups was signed in 2008 after several peace talks.
- With the gradual improvement of law and order AFSPA has been repealed in several areas.
- The Manipur government recently decided to [withdraw from the SoO agreement](#).
- The Valley Insurgent Groups which remains active never entered an agreement with the Centre or participated in any peace talks.

14.2 Khalistan and the Sikh Diaspora

Why in news?

A tableau celebrating the assassination of late Prime Minister Indira Gandhi by her Sikh bodyguards went around the city of Brampton in Canada.

What is the background of the issue?

- The 39th anniversary of *Operation Bluestar*, the controversial Army action to flush out Khalistani militants from the Golden Temple in Amritsar, was observed on June 6.
- In the lead up to it, a parade was organised in Brampton, Ontario, in Canada. The tableau drew strong reactions from India, with External Affairs Minister S Jaishankar registering his disapproval.

What was the course of the Khalistan Movement?

- The [Khalistan movement](#) is a Sikh nationalist movement that wants to create an independent state (North-Western Republic of India) for Sikh people, via armed struggle.
- The idea of Khalistan was first created in 1940s, remained idle but was revived by an NRI seeking a separate homeland for Sikhs.
- In early 1980s, the movement had emerged as a major separatist movement.
- Demands for separate nation-hood for Punjab was carried out through violent protests and killings of high profile persons in Indian government.

What are the historical events responsible for Khalistan?

- **1947 Partition of India** - Independence of India was not a joyful event for Sikhs, partition left Sikhs in a lot of discontentment with regard to their traditional lands being lost to Pakistan.
- **Punjabi Suba movement** - A movement was initiated in 1955 under Akali Dal a Sikh dominated political party.
- It seeks the re-organisation of Punjab along linguist lines, seeking division of the state into Punjabi and non-Punjabi speaking areas.
- The [movement](#) resulted in trifurcation of Punjab into Punjab, Haryana and Himachal Pradesh.

- **Water sharing** - The disputes of sharing of waters of Ravi-Beas and Sutlej between the two states, Punjab and Haryana were the foundation on which the Khalistan dispute was created.

How Khalistan and Canada are connected?

- As per the 2021 Canadian census, Sikhs account for 2.1 % of Canada's population, and are the country's fastest growing religious group. After India, Canada is home to the largest population of Sikhs in the world.
- Sikhs lawmakers and officials serve at all levels of Canada's government.
- The first declaration for a separate Sikh state was made in the United States on October 12, 1971, an advertisement in The New York Times proclaimed the birth of Khalistan.
- Today, the movement finds little resonance in the Sikh population within India. However, it survives in parts of the Sikh diaspora in countries like Canada, the US, and the UK.

What is the relationship between Khalistan and the Sikh diaspora?

- The support for Khalistan within the Sikh diaspora is in its lack of connection to the ground realities of Punjab.
- The diaspora comprises people who chose to leave, including those who left during the 1980s, when the movement was at its peak.
- The Indian state was extremely hard on Khalistani separatists, with a lot of extra-judicial arrests and killings.
- The memories of those times have kept the movement alive among these people, even though the ground realities of Punjab are very different today.
- There is a small minority that is clinging to the past, and that small minority remains significant not because of popular support.

What is the way forward?

- The Khalistan movement is not about popular support rather it is about geo-politics.
- Countries like China and Pakistan tolerate, subsidise and assist in various ways the Khalistan movement on the basis that it is making trouble for their enemies in India.

PRELIM BITS

15. HISTORY, ART & CULTURE

Ram Prasad Bismil

126th birth anniversary of Ram Prasad Bismil, a revered symbol of patriotism and Hindu-Muslim unity, was commemorated recently

- Ram Prasad Bismil was born on June 11, 1897 in the United Provinces (now Uttar Pradesh) Shahjahanpur district.
- He joined the *Arya Samaj* and became a prolific writer and poet.
- He wrote patriotic verses in Hindi and Urdu under pen names like '*Aqat*', '*Ram*', and the one that is most known '*Bismil*'.
- He wrote the poem *Mera Janm* (My Birth), venting out his anger over death sentence handed out to Arya Samaj missionary *Bhai Parmanand*.

Ghulami Mita Do was his famous poem that denotes he was not willing to negotiate or beg for his country's freedom, if the British did not accede, he was willing to take it by force.

The Mainpuri Conspiracy, 1918

- Bismil started a revolutionary organisation called *Matrivedi* (The Altar of the Motherland) and joined forces with fellow revolutionary Genda Lal Dixit.
- Dixit was well-connected with dacoits of the state and wanted to utilise them in the armed struggle against the British.
- In 1918, Bismil wrote the famous poem, *Mainpuri ki Pratigya*.
- In order to collect funds for their parties, he carried out at least 3 instances of looting at government offices in Mainpuri district.

Hindustan Republican Association, 1923

- Ashfaqullah Khan and Bismil found the Hindustan Republican Association (HRA) in 1923.
- **Aim** - Winning freedom for the country through an armed revolution.
- HSRA published a manifesto titled “The Revolutionary” in 1925.
- It was renamed as the Hindustan Socialist Republican Army (HSRA), 1928.

Kakori Conspiracy, 1925

- In August 1925, an armed robbery took place on board the Kakori Express which was going from Shahjahanpur to Lucknow.
- It was carrying money that had been collected at various railway stations and was to be deposited in Lucknow.
- In this planned robbery, carried out to fund the activities of the HSRA, Bismil, Khan and over 10 other revolutionaries stopped the train and fled with the cash they found in it.
- Within a month of the robbery, many members of the HSRA were arrested.
- In September 1926, Bismil was arrested and was sentenced to death.
- The sentence was carried out on December 19, 1927.

Liaquat-Nehru Pact

It has been 73 years since the treaty of Liaquat-Nehru pact signed between India and Pakistan.

- It was signed in 1950 by the prime ministers, Jawaharlal Nehru and Liaquat Ali Khan.
- It was a bilateral treaty between India and Pakistan regarding the rights of minorities and refugees.
- **Aim** - To provide a framework for the treatment of minorities in both countries following Partition, which was accompanied by massive communal rioting.
- The Nehru-Liaquat Pact is also known as the Delhi Pact, 1950.
- An estimated 1 million people Hindus from East Pakistan and Muslims from West Bengal crossed the borders during 1950 after the partition.
- **Features** - It is to ensure that
 - Refugees were allowed to return unmolested to dispose of their property,
 - Abducted women and looted property were to be returned,
 - Forced conversions were unrecognized, and
 - Minority rights were confirmed.
- Minority commissions were established to implement these terms, and confidence was in fact restored for a time.
- The Governments of India and Pakistan solemnly agree that each shall ensure, to the minorities throughout its territory, complete equality of citizenship.
- Members of the minority shall have the equal opportunity with the members of the majority community.
- They have the rights to participate in the public life, to hold political and other office and to serve in civil and armed forces of their country.
- Both governments agreed to declare these rights to be fundamental and undertake to enforce them respectively.

Rani Durgavati

Prime Minister concluded the 6-day Rani Durgavati Gaurav Yatra launched by Shivraj Singh Chouhan, Chief Minister in Madhya Pradesh.

- She was born in 1524, in Mahoba’s Chandela dynasty, the present-day Uttar Pradesh, near the southern border with MP.
- *The Chandelas were known for building the famous Khajuraho temples in the 11th century.*
- She was married to Dalpat Shah who belongs to Garha-Katanga kingdom, consists Narmada Valley and parts of northern MP.

- In 1550, Dalpat Shah was died and then she then ruled the country in name of her son Bir Narayan.
- Ministers Adhar Kayastha and Man Thakur helped the Rani in looking after the administration successfully and effectively.
- Rani moved her capital to Chauragarh (a fort of strategic importance situated on the Satpura hill range) in place of Singaurgarh.
- In 1556 A.D. Rani Durgavati defeated Bajbahadur, Sultan of Malwa.
- She fought Mughal emperor Akbar and his commander Asaf Khan and gave the ultimate sacrifice.
- She was a good marksman, skilled at using guns, bows, and arrows and so intent on hunting tigers. She built so many lakes in her state.
- She extended her patronage to the scholars and welcomed the Vitthalnath of Vallabh community and took diksha from him.
- She was secular and appointed many eminent Muslims on important posts.
- **Gonds** – Group of aboriginal peoples (now officially designated as Scheduled Tribes) of central and south-central India, about two million in number.
- They live in the states of Madhya Pradesh, Maharashtra, Telangana, Andhra Pradesh, Bihar, and Odisha.

In 1983, the Government of Madhya Pradesh renamed the University of Jabalpur as Rani Durgavati Vishwavidyalaya in her memory.

Tughlaqabad

Archaeological Survey of India (Delhi circle) is protecting the ancient Tughlaqabad fortification which has cracks and broken walls.

- It was built by the founder of the Tughlaq Dynasty, Ghiyas-ud-din-Tughlaq in 1321 at Delhi.
- Tughlaq's name was Ghazi Malik, and he started out as a governor under the rule of Alauddin Khalji.
- It was established as the 3rd historic city of Delhi, which was later abandoned in 1327.
- The fort is a gigantic stone structure, with 10-15 metres high wall.
- It is in two parts, the citadel and palaces along the southern walls forming one unit and the city to the north the other.
- The fort-city of Tughlaqabad was supposed to have as many as 52 gates, out of which only 13 remain now.
- The 'Tudor' arch, a slightly-pointed 'Tartar' dome and the use of beam-and-arch for openings are new features.
- Originally it stood within an artificial reservoir and was connected with Tughluqabad by a causeway, now pierced by the Qutb-Badarpur road.
- Across the main entrance of Tughluqabad on the south is Ghiyathu'd-Din's tomb.
- It is believed that the fort was cursed by the famous Sufi saint, Nizamuddin Auliya who was contemporary of Ghiyas-ud-din-Tughlaq.

Seven Historic Cities of Delhi	Founders
LalKot (Qila Rai Pithora)	Anangpal Tomar
Siri	Alauddin Khilji
Tughlaqabad	Ghiyasuddin Tughlaq
Jahanpanah	Muhammad Tughlaq
Ferozabad	Feroz Shah Tughlaq
Dinpanah	Started by Humayun & finished by Sher Shah
Shahjahanabad (Purani Dilli)	Shah Jahan

International Yoga Day

- Yoga is an ancient physical, mental and spiritual practice that originated in India.
- **UN Definition on Yoga** - Yoga embodies unity of mind and body, thought and action, restraint and fulfillment, harmony between man and nature, a holistic approach to health and well-being.
- It emphasizes physical postures (asanas), breathing techniques (pranayama), and meditation (dyana).
- International Yoga Day is celebrated on June 21 every year because it is the longest day of the year in the northern hemisphere.

- **Theme of 2023** - Yoga for Vasudhaiva Kutumbakam (Yoga for the welfare of all in the form of 'One World-One Family').

- **Aim** - To raise awareness about the numerous benefits of yoga and promote its holistic approach to physical, mental, and spiritual well-being.

- **Yoga Sutras** - Patanjali, also known as Gonardiya or Gonikaputra, was the author of Yoga-sutras.

- The Yoga Sutras is Yoga school's treatise on how to accomplish this.

- **Yoga School** - It is closely related to the Samkhya school of Hinduism.

- The purpose of yoga is liberation from suffering, caused by entanglement with the world.

- It believes Ashtanga yoga eventually leads to liberation.

- Yoga school is one of the orthodox schools in Indian philosophy.

Schools of Indian Philosophy	Founder	Significance
Vaishesika	Kanada	Naturalism
Nyaya	Gautama	Logic, Methodology, and Epistemology
Samkhya	Kapila	Reality
Yoga	Patanjali	Meditation for achieving Mukti
Purva Mimansa	Jaimini	Power of Yajnas and Mantras
Vedanta or Uttara Mimansa	Vyasa	World is unreal and Brahman is the only real

Gandhi Peace Prize

Gandhi Peace Prize 2021 has been conferred upon Gorakhpur-based Gita Press

- **Instituted Year** – 1995, on the 125th birth anniversary of Mahatma Gandhi.
- **Eligibility** - It is awarded for social, economic and political transformation through non-violence, to any deserving persons or institutions, annually by the Government of India.

- It is open to all persons regardless of nationality, race, language, caste, creed or gender and any association, institution or organisation.

- Work achieved within the 10 years preceding the nomination is considered for the award.

- **Rewards** - The award carries a cash prize of ₹1 crore, a citation, a plaque and an exquisite traditional handicraft/handloom item.

- **Awarding Committee** - The awardee is selected by a 5-member jury comprising of the Prime Minister, Chief Justice of India, Leader of Opposition and 2 eminent personalities.

- The decision of the jury is final and cannot be challenged or appealed.

- **Gandhi Peace Joint Award** – If 2 persons or an organization deserved equally for this prize.

- **Past Awardees** - Ramakrishna Mission (1998), Grameen Bank (2000), Nelson Mandela (2000), ISRO (2014), Sheikh Mujibur Rahman (2020).

Gita Press
<ul style="list-style-type: none"> • Founded in 1923 by Hanuman Prasad Poddar and Jay Dalal Goyandka. • It is a unit of Gobind Bhawan Karyalaya, Kolkata, registered under the West Bengal Societies Act, 1960. • It is one of the world's largest publishers and is most famous for publishing the Hindu text <u>Srimad Bhagwat Gita</u>. • As of date, the institution has published 41.7 crore books in <u>14 languages</u>, including 16.21 crore copies of the Gita.

Zardosi Embroidery

Zardosi artisans made two lakh car hangers designed like a crown for King Charles III's coronation.

- Zardozi comes from two Persian words - zar or zarin meaning 'gold', and dozi meaning 'sewing'.
- It is a type of heavy and elaborate metal embroidery on a silk, satin, or velvet fabric base.
- Designs are often created using gold and silver threads and can incorporate pearls, beads, and precious stones.
- Other names

- **Zardozi** - Bhopal, Delhi, Hyderanad and Uttar Pradesh
- **Kamdani or badla** – Lucknow
- **Danka and gotta-patti** – Rajasthan
- **Tilla** - Jammu & Kashmir and parts of western India.
- Historically, it was used to embellish the attire of the royals.
- It is found in Iran, Azerbaijan, Iraq, Kuwait, Syria, Turkey, Central Asia, India, Pakistan and Bangladesh.
- Main Centers in India - Lucknow, Farrukhabad, Chennai, Bhopal, etc.
- Zardosi embroidery has been in existence in India from the time of the *Rig Veda*.
- The Delhi Sultanate era further boosted this craft.
- It attained its summit in the 17th century, under the patronage of *Mughal Emperor Akbar*.
- Under the rule of Aurangzeb, the royal patronage stopped and this led to the decline of the craft.
- In 2013, the *Geographical Indication Registry* (GIR) accorded GI registration to the *Lucknow zardozi*.

Dhams	Temples	Yugas
Badrinath	Badrinarayan Temple of Vishnu	Satya Yuga
Dwarka	Dwarkadhish Temple of Krishna	Dwapar Yuga
Puri	Jagannath Temple Puri	Kali Yuga
Rameswaram	Shree Rameshwaram Jyotirlinga Temple	Treta Yuga

Yakshagana

The Yakshagana team perform charity shows in Germany to help artistes who are economically not sound and to support the education of poor students through scholarships.

- **Origin** - Yakshagana also known as **Bayalatam** is a traditional dance-drama performance.
- “Yaksha” means “celestial” and “Gana” means “music”.
- It is a rare combination of *dance, music, song, scholarly dialogues and colourful costumes*.
- **Associated State** - It is performed in **Karnataka** and the Kasaragod district of **Kerala**.
- Traditionally, Yakshagana was performed in the open air by all-male casts sponsored by various Hindu temples.
- Since the mid-20th century many performances have been held on indoor stages, and women began to train in the tradition in the 1970s.
- **The Act** - Each performance typically focuses on a small sub-story (**known as ‘Prasanga’**) from ancient Hindu epics of *Ramayana* or *Mahabharata*.
- **Musical instruments**- Chande (drums), harmonium, maddale, taala (mini metal clappers), flute, etc.
- **The Troupes** (known as Melas) - Saligrama mela, Dharmasthala Mela, Mandarthi Mela, Perduru Mela, etc.
- **The Costumes** – Include large headgear, brightly colored faces, elaborate costumes all over the body, and musical beads on the legs (Gejje).
- Yakshagana is similar to the most notable **Kathakali of Kerala** and **Terukkuttu of Tamil Nadu**.

Char Dham Yatra

Over 31,78,000 people have visited and 149 pilgrimages died in the Char dham Yatra in the initial 65 days in Uttarakhand.

- **Char Dham** – **Adi Shankaracharya** (686–717 AD) propounded the concept of the Char Dham temples.
- He also established the famous Shankaracharya Peethams or Mathas in the four directions for the study and propagation of the 4 Vedas.
- **Badrinath (Uttarakhand)** - The temple is also one of the 108 Divya Desams dedicated to Vishnu holy shrines for Vaishnavas who is worshipped as Badrinath.
- It is situated along the banks of *Alaknanda River*.
- **Dwarka (Gujarat)** – It is dedicated to Lord Krishna.

- It is located on the right bank of the Gomti River at the mouth of the Gulf of Kutch facing the Arabian Sea.
- **Puri (Orissa)** - Jagannath Temple located on the coast of Bay of Bengal.
- It is associated with the Mahanadi River.

Chota Char Dham (Uttarakhand Char Dham)

- It includes Kedarnath, Yamunotri, Badrinath, and Gangotri.

• It is situated in Garhwal region of Uttarakhand, Indian Himalayas.

• **Yamunotri Dham** – It is situated at Yamunotri where the sacred river the Yamuna originates.

• It named after Goddess Yamuna, the twin sister of Yama (the God of death).

• **Gangotri Dham** Gaumukh, the sacred snout of the Gangotri Glacier is where the River Ganga begins its journey.

• Dedicated to Goddess Ganga.

• **Kedarnath Dham** - It is the highest located jyotirling.

• The temple is an old stone edifice located on the shores of Mandakini River.

• It is believed to have been built by the Pandavas and revived by Adi Sankara in 8th century CE.

• **Badrinath Dham** – It is sacred to Lord Vishnu, particularly in Vishnu's dual form of Nara-Narayana.

• Badrinath temple was re-established by Adi Shankracharya in the 8th century.

• The Badrinath Dham is situated on the banks of the Alaknanda River.



Trimbakeshwar Temple

Shri Trimbakeshwar temple in Maharastra witnessed communal tensions for the past 6 months.

- **Location** - Shri Trimbakeshwar Temple is located in Nashik City, Maharastra.
- It is located near the mountain named Brahamagiri from which the river Godavari flows.

• There are 3 hills surrounding this temple – Brahmagiri, Nilagiri and Kalagiri.

• **History** - It was constructed by 3rd Peshwa Balaji Bajirao also known as Nana Saheb, in the mid-18th century (1740-1760).

• **Special features** - The entire temple is built with black stone.

• Trimbakeshwar Jyotirlinga is only one of the 12 jyotirlingas in India.

• **Trimbakeshwara** - It not only honor Lord Shiva but the other two gods in the Holy Trinity - Lord Vishnu and Lord Brahma as well.

• They all exist within the hollow space within the Shivalinga and hence the name Trimbakeshwara (3 Lords).

• They are covered by a jewelled crown that is believed to date to the era of the Pandavas.

A stambha is a pillar or a column employed in Indian architecture, it sometimes bears inscriptions and religious emblems.

Kumbh Mela

- It is a Hindu religious festival that is celebrated 4 times over the course of 12 years.
- The site of the observance rotating between 4 pilgrimage places on four sacred rivers.
 1. Haridwar - Ganges River
 2. Ujjain - Shipra River
 3. Nashik - Godavari
 4. Prayag - Ganges, Yamuna, and the mythical Sarasvati.

- Jyotirlinga means *column or pillar of light*.
- The stambha symbol represents that there is no beginning or end.
- The temple has a well called Amritavarshini, believed to be the source of the Godavari.
- The temple has a well called Amritavarshini, believed to be the source of the Godavari.
- **Trimbakeshwar Simhastha** - The famous pilgrimage festival, Kumbh Mela, occurs here once every 12 years.

Upanishads and Scriptures

PM Modi presented the U.S. President, a first edition print of the book *The Ten Principal Upanishads* from 1937.

Hindu scriptures

- There are broadly 2 categories of Hindu sacred texts.
- **Shruti (the revealed)** – Sruti is direct experience, Great Rishis heard the eternal truths of religion and left a record of them for the benefit of posterity.
- It constitute the Vedas (Rig, Yajur, Sama and Atharva) and accompanying texts.
- The Vedas are primary authority and foundational scriptures of the Hindus.
- **Smriti (the remembered)** – Smriti is a recollection of that experience so it is secondary authority.
- The Smritis or Dharma Sastras also are books written by sages, but they are not the final authority.
- If there is anything in a Smriti which contradicts the Sruti, the Smriti is to be rejected.
- It includes Brahmanas (ritual texts), Aranyakas (forest or wilderness texts), and Upanishads (philosophical texts).
- These include the great epics of *Ramayana* and *Mahabharata*, Dharmashastras, Puranas and all other post-Vedic scriptures.

Ten Principal Upanishads (Dashupanishads)	
Esha	Mandukya
Kena	Taittiriya
Katha	Aitareya
Prashna	Chandogya
Mundaka	Brihadaranyaka

Upanishads

- The Upanishads, also known as the Vedanta (the end of Veda) forms the very foundation of Hinduism.
- It is a religious and Philosophical treatise that speculate about the ontological connection between humanity and the cosmos.
- Dated to roughly 800-500 BC, the Upanishads discuss concepts such as transmigration, nature and God.
- They represent the “Knowledge of Brahman” (Brahma-vidya) and are mostly related to Vedas.
- **The oldest Upanishads** - Brihadaranyaka and Chandogya Upanishads – 1st millennium BC.
- **The latest Upanishad** - Muktika Upanishad - by Dara Shikoh – 1656.
- The Upanishads were given particular importance by 8th century Hindu scholar Adi Shankara, whose interpretations synthesised the *Advaita Vedanta* tradition.

GI tags in U.P.

Seven products from Uttar Pradesh recently got Geographical Indication tag.

Recently GI Tags from UP	Significance
Amroha Dholak	<ul style="list-style-type: none"> • It is a musical instrument made of natural wood.
Mahoba Gaura Patthar Hastashlip	<ul style="list-style-type: none"> • It is a stone craft, a very unique and soft stone with scientific name, the '<i>Pyro Flight Stone</i>'. • Gaura stone craft is made of radiant white-coloured stone that is predominantly found in this region.

Baghpat Home Furnishings	<ul style="list-style-type: none">• Only cotton yarn are used in the handloom weaving process.• It is famous for weaving on the <i>frame loom</i> instead of the pit loom since generations.
Barabanki Handloom Product	<ul style="list-style-type: none">• This handloom product mainly consists of cotton.• It is manufactured using traditional techniques.
Kalpi Handmade Paper	<ul style="list-style-type: none">• Kalpi has historically been a centre of handmade paper manufacturing.
Sambhal Horn Craft	<ul style="list-style-type: none">• Sambhal city is associated with a unique kind of horn and bone craft items.
Mainpuri Tarkash	<ul style="list-style-type: none">• Tarkashi is a technique of inlaying brass, copper, and silver wires in wood.• It is a unique and artistic product of the Mainpuri district.• It is used for decorating jewelry boxes, name plaques, and other similar items.

Guinness World Record

PM Narendra Modi-led yoga session at United Nations headquarters, on the occasion of 9th International Yoga Day, created a Guinness World Record for participation of people of most nationalities in a yoga event.

- Guinness World Records originally known as the Guinness Book of Records documents record-breaking achievements of all kinds, listing world records both of human achievements and the extremes of the natural world.
- It is a reference book published every year in different languages around the world.
- It was formed on 1955 by Sir Hugh Beaver, Managing Director of the Guinness Brewery.
- **World Record** - Defined as the best performance recorded in the world in any sphere of art or profession.
- **Criteria** - A record must satisfy all of the following criteria to count.
 - It should be objectively measurable.
 - It should be breakable it cannot be something so unique that only one person can do it.
 - It should also be standardisable with a possibility to create a set of parameters and conditions that all challengers can follow.
 - It should be verifiable.
 - It should be based on only one variable.
 - It should be the best in the world.
 - For any new record, GWR sets a minimum standard that has to be met for the record to be broken.
- **Exceptions** - It states several types of records it will not accept for ethical reasons, such as those related to the killing or harming of animals.
- Environmentally unfriendly records (such as the releasing of sky lanterns and party balloons) are no longer accepted or monitored.
- In addition to records relating to tobacco or cannabis consumption or preparation are not accepted.

16. GEOGRAPHY

Cyclone and its types

Cyclone Biparjoy, which is expected to generate wind speeds of 125-135 kmph with gusts reaching up to 150 kmph by the time it reaches land, is a tropical cyclone.

- A cyclone is a large-scale system of air that rotates around the centre of a low-pressure area. It is usually accompanied by violent storms and bad weather.

- As per NDMA, a cyclone is characterised by inward spiralling winds that rotate *anticlockwise* in the *Northern Hemisphere* and *clockwise* in the *Southern Hemisphere*.
- Conditions for formation of cyclone** - Temperature must be (> 26 degree Celsius) to a depth of 60 m with turbulent transfer of water vapour and the atmospheric instability could create massive vertical cumulus clouds.
- The *NDMA* classifies cyclones broadly into 2 categories:
 - Tropical cyclones
 - Extratropical cyclones

National Disaster Management Authority (NDMA)	
• Nodal agency to alleviate sufferings arising out of disasters—biological, chemical, physical or hydrological	
• Created under Disaster Management Act 2005	
• Chair - Prime Minister	

Type of Disturbances	Wind Speed in Km/h	Wind Speed in Knots
Low Pressure	Less than 31	Less than 17
Depression	31-49	17-27
Deep Depression	49-61	27-33
Cyclonic Storm	61-88	33-47
Severe Cyclonic Storm	88-117	47-63
Super Cyclone	More than 221	More than 120

Tropical Cyclones

- Tropical cyclones are those which develop in the regions between the *Tropics of Capricorn and Cancer* and are the most devastating storms on Earth.
- Characteristic features of tropical cyclones
 - Eye** - a central region of clear skies, warm temperatures, and low atmospheric pressure;
 - Eyewall** - the most dangerous and destructive part where winds are strongest and rainfall is heaviest
 - Rainbands** - secondary cells that spiral into the center of the storm. The core of the storm turns warm, and the cyclone gets most of its energy from the *“latent heat”* released when water vapour that has evaporated from warm ocean waters condenses into liquid water.
- The winds blow *counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere*.
- Moreover, warm fronts or cold fronts aren’t associated with tropical cyclones.
- Tropical cyclones are known by various names in different parts of the world.

Name	Area
Hurricanes	North Atlantic Ocean and eastern North Pacific
Typhoons	Western North Pacific around Philippines, Japan, and China
Tropical cyclones	Western South Pacific and Indian Ocean

Extratropical Cyclones

- It is also known as *mid-latitude cyclones or temperate cyclones*.
- They occur in temperate zones and high latitude regions, though they are known to originate in the *Polar Regions*.
- They have cold air at their core, and derive their energy from the release of potential energy when cold and warm air masses interact.
- These storms always have one or more fronts connected to them, and can occur over land or ocean.
- An extratropical cyclone can have winds as weak as a tropical depression, or as strong as a hurricane.
 - Examples of extratropical cyclones - *Blizzards, Nor'easters, etc.*

Cyclone Biparjoy

After Mocha in the Bay of Bengal, the second storm of the 2023 North Indian Ocean named Biparjoy has developed in the Arabian Sea.

- A very severe cyclonic storm along the coastline of Karnataka, Goa and Maharashtra in the Arabian Sea
- The cyclone is expected to keep the monsoon a little subdued.
- The name “Biparjoy” was suggested by Bangladesh and the word means ‘disaster’ or ‘calamity’ in Bengali.
- **Naming of tropical cyclones** - Worldwide, there are 6 Regional Specialised Meteorological Centres (RSMCs) and 5 regional Tropical Cyclone Warning Centres (TCWCs) mandated for issuing advisories and naming of tropical cyclones.
- Indian Metrological Department (IMD) is one of the six RSMCs to provide tropical cyclone and storm surge advisories to 13 member countries under the WMO/Economic and Social Commission for Asia-Pacific (ESCAP) Panel.
- Countries include Bangladesh, India, Iran, Maldives, Myanmar, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates and Yemen.

Mayon Volcano

A gentle eruption of the most active volcano in Philippines has forced nearly 18,000 people to flee to emergency shelters.

- **Mayon Volcano** - It is a highly active stratovolcano in the southeastern Luzon, Philippines.
- It is called the world’s most perfect volcanic cone because of the symmetry of its shape.
- It is located at the centre of Mayon Volcano National Park.
- It is located on the Pacific Ring of Fire, the rim of seismic faults where most of the world’s earthquakes and volcanic eruptions occur.
- It’s most destructive eruption was in 1814, when the town of Cagsawa was buried and approximately 1,200 people were killed.

Pacific Ring of Fire

- Pacific Ring of Fire or Circum-Pacific Belt is a long seismically active belt along the Pacific Ocean characterized by earthquake epicentres, active volcanoes, and tectonic plate boundaries.
- It is home to about 75% of the world’s volcanoes and about 90% of earthquakes occur here.
- It traces boundaries between several tectonic plates - The Pacific, Cocos, Indian-Australian, Nazca, North American, and Philippine Plates.
- The abundance of volcanoes and earthquakes along the Ring of Fire is caused by the amount of movement of tectonic plates in the area.



Congo Rainforest

A recent report says that the Congo rainforest continues to vanish with half a million hectares lost in 2022.

- It is the world’s 2nd largest tropical rainforest after the Amazon rainforest.
- The rainforest is spread across 6 African countries - Cameroon, Central African Republic, Republic of Congo, Democratic Republic of Congo (DRC), Equatorial Guinea, and Gabon.
- 60% of rainforest lies in the Democratic Republic of the Congo.
- It is known for its high levels of biodiversity, including more than 600 tree species and 10,000 animal species.
- It is the world’s largest carbon sink (anything that absorbs more carbon from the atmosphere than it releases) hence they are known as the “lungs of Africa”.

Quick Facts

Peat Lands - They are wetlands that contain a mixture of decomposed organic material, partially submerged in a layer of water, lacking oxygen.

Brazzaville declaration

- To promote better management and conservation of world's largest tropical peatlands-Cuvette Centrale region in Congo Basin from unregulated land use and prevent its drainage and degradation.
- Brazzaville - Capital of **Democratic Republic of Congo**.
- The Democratic Republic of Congo (DRC), the Republic of Congo and Indonesia have jointly signed the Brazzaville declaration.



Amazon Rainforest

- It is the world's largest tropical rainforest and is considered the '**Lungs of the Earth**'.
- Spans over 9 countries - Brazil, Bolivia, Peru, Ecuador, Guyana, French Guiana, Suriname, Colombia, Venezuela.
- Amazon River is the largest river in the world.

Ocean's cooling of Planet

A recent study says that oceans cool the planet by releasing short-lived halogens that contribute 8-10% of cooling.

Halogens

- A halogen is a chemical element that forms a salt when it reacts with metal.
- Halogens are all nonmetallic substances and create brittle solids and have poor heat and electrical conductivity.
- The halogen elements are the six elements in Group 17 of the periodic table.
- **Short-lived Halogens** - Short-lived halogens are chlorine, bromine and iodine compounds with a lifetime of less than 6 months in the atmosphere and are naturally produced by the oceans.

Findings

- **Increase in warming** - The short-lived halogens
 - Increases the global methane burden by 14 % and 9 % for pre-industrial and present-day conditions
 - Increases the levels of water vapour, a greenhouse gas
 - Reduces the formation of cooling aerosols, minute particles suspended in the atmosphere that reflect sunlight
- Though these halogens drive an increase in warming by influencing methane, water vapour and aerosols, they compensate this by destroying ozone, which exerts a cooling effect.
- **Cooling the planet** - Halogens cause a depletion of ozone (a greenhouse gas that traps outgoing radiation) leading to warming in the troposphere.
- Short-lived halogens from oceans reduces warming by depleting ozone contributing to its cooling effect.
- Currently, these halogens contribute 8-10% of cooling.
- Overall, the net cooling effect was found to be $-0.13 \pm 0.03 \text{ W m}^{-2}$.

Dal Lake

The J&K government has attributed the death of thousands of fish in the Dal Lake in Srinagar to thermal stratification.

- Dal Lake, situated in the northeast of Srinagar in Kashmir valley.
- It is the 2nd largest lake in Jammu and Kashmir.
- The lake is probably of fluvial origin, formed from the oxbows of river Jhelum.
- Due to its beauty and attraction, Dal Lake is also known as the "Jewel in crown of Kashmir or Srinagar's Jewel".

- It is declared as a protected wetland and a commercial fishing point.
- It has witnessed shore line Mughal gardens, such as Shalimar Bagh and Nishat Bagh built during the reign of Mughal Emperor Jahangir.
- It is a part of a natural wetland including its floating gardens.
- The floating gardens, known as *Raad* in Kashmiri, blossom with lotus flowers.
- The wetland is divided by causeways into 4 basins; Gagribal, Lokut Dal, Bod Dal and Nagin (although Nagin is also considered as an independent lake).
- Lokut-dal and Bod-dal each have an island in the centre, known as Rup Lank (or Char Chinari) and Sona Lank respectively.

Thermal Stratification
occurs when the surface layer of water, warmed by the sun, becomes less dense than the water underneath it.

Kakhovka Dam

Kakhovka dam in southern Ukraine was collapsed recently, causing extensive flooding.

- The dam is built on Ukraine's Dnipro River.
- **Dnipro River** – It separates Ukraine into two parts – east and west.
- It flows north to south connecting the capital, Kiev, to the Black Sea.
- It was built in 1956 as part of the Kakhovka hydroelectric power plant.
- The reservoir it contains holds water of about the same volume as the Great Salt Lake in Utah.
- Bursting the dam could send a wall of water flooding settlements below it, including Kherson.
- Water from the reservoir supplies the Crimean peninsula to the south, which was annexed by Russia in 2014, as well as the Zaporizhzhia nuclear plant, Europe's largest, to the north.
- It also helps power the Kakhovka hydroelectric plant.



Zaporizhzhia Nuclear Power Plant

- It is situated in the Southeastern Ukraine and is the largest nuclear power plant in Europe.
- The nuclear power plant has 6 nuclear reactors and one of the 4 operating nuclear power plants in the country.
- It generates up to 42 billion kWh of electricity, accounting for about 40% of the total electricity generated by all the Ukrainian NPPs and 1/5th of Ukraine's annual electricity production.
- Ukrainian and UN experts said that the kakhovka dam collapse does not pose an immediate threat to the Zaporizhzhia Nuclear Power Plant (NPP) but will have long-term implications for its future.

East of Horn of Africa and the Great Lakes (EHAGL) region

According to the United Nations High Commissioner for Refugees (UNHCR), there were approximately 11.71 million Internally Displaced Persons (IDPs) in East and Horn of Africa and the Great Lakes (EHAGL) region as of March 31, 2023.

Horn of Africa

- It is a region in eastern Africa.
- Countries included - Djibouti, Eritrea, Ethiopia, and Somalia.
- Coastlines included - Red Sea, Gulf of Aden, and Indian Ocean.
- **Rivers flowing in the region** – Blue Nile, White Nile, Dawa River.
- **Lakes present in the region** – Lake Tana, Lake Turkana.
- **Ogaden desert** – It is situated between the Somalia-Ethiopia border and the Ethiopian Eastern Highlands.



- The Horn of Africa, almost equidistant from the Equator and the Tropic of Cancer, is an arid region.

The African Great Lakes Region

- The African Great Lakes are a series of lakes constituting the part of the Rift Valley lakes in and around the East African Rift.
- They include Lake Victoria, the 2nd largest fresh water lake in the world in terms of surface area.
- Lake Tanganyika, the world's second largest in volume as well as the second deepest.
- **Lists of the African Great Lakes** - Lake Victoria, Lake Tanganyika, Lake Malawi, Lake Turkana, Lake Albert, Lake Kivu, and Lake Edward.
- The 4 countries that make up the Great Lakes region are the Democratic Republic of the Congo (D.R.C.), Burundi, Rwanda, and Uganda.



Great Lakes of North America

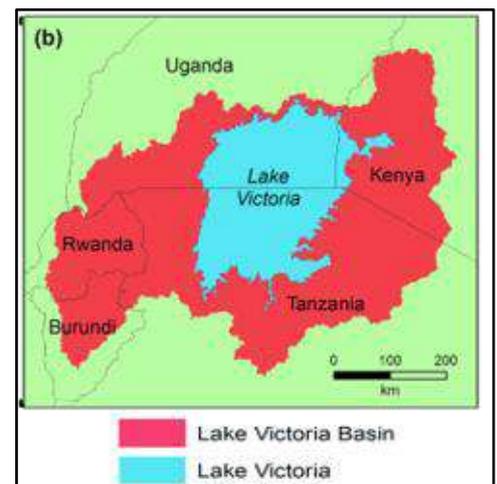
- It comprises 5 lakes - Superior, Michigan, Huron, Erie, and Ontario.
- The lakes provide a natural border between Canada and the United States.
- Lake Superior is the largest of the five Great Lakes of North America.
- Niagara River, including Niagara Falls, connects Lake Erie to Lake Ontario.



Lake Victoria Basin

A recent report shows that heavy rains, wind storms, and floods threaten the survival and water access of the communities living in the Lake Victoria Basin (LVB), East Africa.

- **Location** - Lake Victoria Basin is situated at East Africa.
- **Features** - Lake Victoria is the
 - Largest freshwater lake in Africa
 - World's largest tropical lake
 - Second largest freshwater lake in the world, after Lake Superior in North America
 - Largest inland water fishery sanctuary in East Africa
- **Climate** - It has modified equatorial climate, regional rainfall regulates the water levels in the lake.
- Most of the lake's water comes from rainfall, while almost the same amount of water is lost through evaporation and carried out by the Nile.
- **Associated countries** - The basin's catchment area traverses through 5 East African Countries - Tanzania (44%), Kenya (22%), Uganda (16%), Rwanda (11%) and Burundi (7%).
- This trans-boundary asset is shared by Tanzania (51%), Uganda (43%) and Kenya (6%).
- **Rivers** - A number of important rivers flow into Lake Victoria including the River Mara, Kagera, Yala, Nyando, Bukora and Katonga.
- The White Nile is the only river flowing out of the Lake.



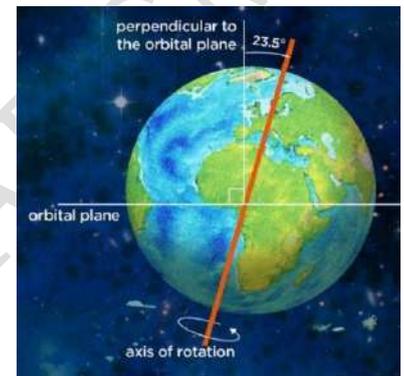
- The Kagera (Akagera) River, which drains the mountains of Burundi and Rwanda, is considered as the source of the Nile.

Groundwater Extraction & the Earth Axis

A recent study says that humans have used enough groundwater to shift Earth's tilt.

- **Earth's Axis and Poles** - The earth spins about its axis which passes through its centre, this movement is called rotation.
- The ends of the axis are the North Pole and South Pole respectively.
- This axis is inclined **23.5 degrees** away from the vertical that is 66.5 degrees from the horizontal plane of its orbit.
- The earth rotates from west to east, and once every 24 hours.
- These are important fixed reference points we use in telling directions on the earth.
- **Polar Motion** - The phenomenon of shifting of poles and the axis naturally because of the mass distribution of planet changes, is known as polar motion.
- Reasons for polar motion - Ocean currents, hurricanes, climate-driven changes in water mass distribution, climate change, etc.
- **Recent Findings** – Between 1993 and 2010, a total of 2,150 Gigatons of groundwater has been removed from earth.
- This has shifted Earth's tilt 31.5 inches eastward.
- The calculations matched with previous research, which estimated that groundwater extraction raised global sea levels by 6.24mm between 1993 and 2010.
- Groundwater extraction from North America and northwestern India (located at the Earth's mid-latitudes), had an enormous impact on the polar motion compared to the extraction in poles or equators.

According to NASA, data from 20th century shows that spin axis drifted about 10 centimetres per year.



17. POLITY

Adverse Possession

The 22nd Law Commission has said in its recent report that there is no justification for introducing any change in the law relating to adverse possession.

- It is a legal concept that allows a person who has unlawfully occupied someone else's land for a certain period of time to claim legal ownership of that land.
- In India, adverse possession has been a part of the legal framework for a long time and is rooted in the idea that land must not be left vacant and instead be put to judicious use.
- The law on adverse possession is contained in the Limitation Act, 1963.
- **Limitation Act, 1963** - Under the Act, any person in possession of private land for over 12 years or government land for over 30 years can become the owner of that property.

Supreme Court's criticism

- The law permitting adverse possession has been condemned by the Supreme Court of India.
- It observed that the law of adverse possession ousts an owner on the basis of inaction within limitation and is irrational, illogical, and wholly disproportionate.

Law Commission's stand

- The 22nd Law Commission in its 280th report has taken a different stand vis-a-vis the Supreme Court.
- It advocates the preservation of law on adverse possession as they currently exist on the law book.
- The report states that there is also no justification to enlarge the period of 12 years under Articles 64, or 65.

- However, two of its *ex officio* members, filed a dissent note saying that the law promotes false claims and recommended for the law to be struck down.

Decline in number of Ordinances

There has been a steady decrease in the number of ordinances promulgated by the Centre since 2019.

Ordinance

- An ordinance is a law promulgated by the President of India on the recommendation of the Union Cabinet, which will have the same effect as an Act of Parliament. This is done only when the Parliament is not in session.
- An ordinance is typically not preferable since it bypasses democratic processes laid down by the Constitution.
- **Article 123** - Power of president to promulgate ordinances during recess of Parliament.
- He can also withdraw an ordinance at any time.
- **Article 213** - Power of governor to promulgate ordinances during recess of the state legislature.
- He can also withdraw an ordinance at any time.
- **Article 239B** - Power of administrator to promulgate Ordinances during recess of Legislature.
- **Article 13** - The definition of 'law' contained in Article 13 expressly includes ordinances.
- **Ratification within 6 weeks or 42 days** - Ordinances must be approved by the Parliament within six weeks from its reassembly or the ordinance lapses at the expiry of 6 weeks.
- **According to articles of 123 and 213** if the two Houses start their sessions on different dates, the later date will be considered.
- **Lapse of ordinance** - The Ordinance may lapse earlier if the President withdraws it or if both Houses pass resolutions disapproving it.
- If an Ordinance makes a law that Parliament is not competent to enact under the Constitution, it shall be considered void.
- **Act of Parliament** - Ordinances have the same force and effect as an act of Parliament but are in the nature of temporary laws.
- **National emergency** - While a proclamation of national emergency is in operation, the President can issue ordinances on the state subjects also, if the Parliament is not in session.
- **Re-promulgation of Ordinance** - If an Ordinance lapses, the only option for the government is to reissue or re-promulgate it.
- **Non-justiciable** - 38 Amendment Act 1975 made the promulgation of ordinances by the president, governors and administrators of union territories non-justiciable.

Withdrawal of general consent for CBI

Tamil Nadu announced that it has withdrawn the general consent given to the Central Bureau of Investigation.

Central Bureau of Investigation (CBI)

- It was set up in 1963 by a resolution of the Ministry of Home Affairs.
- It is now under the Ministry of Personnel, Pension & Public Grievances.
- It was established based on the recommendations of Santhanam Committee.
- It is a non-constitutional body.
- CBI is governed by The Delhi Special Police Establishment (DSPE) Act, 1946.
- Section 6 of the DPSE Act authorises the central government to direct CBI to probe a case within the jurisdiction of any state on the recommendation of the concerned state government.
- The Supreme Court and High Courts, however, can order CBI to investigate such a crime anywhere in the country without the consent of the state.
- There are 2 types of consent for a probe by the CBI. These are: general and specific.
- **General Consent** - When a state gives a general consent to CBI for probing a case, the agency is not required to seek fresh permission every time it enters that state in connection with investigation or for every case.

- **Specific Consent** - When a general consent is withdrawn, CBI needs to seek case-wise consent for investigation from the concerned state government.
- If specific consent is not granted, the CBI officials will not have the power of police personnel when they enter that state.
- **States that have withdrawn the general consent** – Tamil Nadu, Mizoram, West Bengal, Chhattisgarh, Rajasthan, Maharashtra, Kerala, Jharkhand, Punjab and Meghalaya.

Justice Clock

Recently, Justice Clocks have been installed across the court complexes of high courts.

- Justice Clock is a LED display message sign board system (electronic signage system).
- It is to make effective use of database created through National Judicial Data Grid (NJDG) and to make the information available to public.
- **Initiative of** Ministry of Law and Justice to bring awareness to the public about justice sector, advertising the various schemes of the department and to give status of various fields to the public.
- **Contents displayed** - The clock will display the schemes of the Department of Justice and how citizens can benefit from the projects such as e-Courts, Access to Justice and Legal Aid to Poor.
- A total of 39 Justice Clocks are functional in 25 High Courts.

Right of Wife in Husband's Asset

Madras High court in a recent verdict says that wife as homemaker entitled to equal right in family properties.

Recent Verdict

- The Madras High Court said that a wife, who contributed to the acquisition of family assets by performing the house hold chores, would be entitled to an equal share in the properties, as she had indirectly contributed to its purchase.
- The court observed that since homemakers are working for 24 hours without holidays, it cannot be less equated with that of the job of an earning husband who works only for 8 hours.

Women's Rights to Property

- **Property rights as a Mother** - She possesses the right to be served with maintenance from her children who can support her.
- She maintains the right to dispose of her share of the property as per her wishes.
- In the event of a joint family, a widowed mother is entitled to the equal share as of her son.
- **Property rights as a daughter** - According to Hindu Succession Act, 2005 a daughter possesses equal rights of inheritance to her father's property as the son.
- She further secures the right to receive a share in her mother's estate.
- **Property rights as a wife** - A married woman is the sole heir of her husband's property and retains every right to the property that has been earned, gifted or willed to her.
- She does not secure the right to ask her family for the maintenance of the property she acquires from her husband.

Coparcener rights denotes 'Joint Heir' in a Hindu undivided family (HUF) who shares legal rights for inheriting property, title, and money as defined under Hindu Succession Laws.

18. GOVERNMENT INTERVENTIONS & SCHEMES

City Investments to Innovate, Integrate and Sustain 2.0 (CITIIS 2.0)

Cabinet approves City Investments to Innovate, Integrate and Sustain 2.0 (CITIIS 2.0) from 2023 to 2027.

- CITIIS 2.0 is a program conceived by the Ministry of Housing and Urban Affairs (MoHUA).
- It is conceived in partnership with the French Development Agency (AFD), Kreditanstalt für Wiederaufbau (KfW), the European Union (EU), and National Institute of Urban Affairs (NIUA).

- The program will run for a period of 4 years, i.e., from 2023 till 2027.
- The program envisages to support competitively selected projects promoting circular economy with focus on integrated waste management at the city level, climate-oriented reform actions at the State level.
- The program also promotes institutional strengthening and knowledge dissemination at the National level.
- The funding for CITIIS 2.0 would include a loan of Rs.1760 crore and a technical assistance grant of Rs.106 cr. from the EU.
- CITIIS 2.0 aims to leverage and scale up the learnings and successes of CITIIS 1.0.
- CITIIS 1.0 was launched jointly in 2018 by MoHUA, AFD, EU, and NIUA, with a total outlay of ₹933 crore.
- CITIIS 1.0 consisted of three components:
 1. Component 1: 12 city-level projects selected through a competitive process.
 2. Component 2: Capacity-development activities in the State of Odisha.
 3. Component 3: Promoting integrated urban management at the national level through activities undertaken by NIUA, which was the Program Management Unit (PMU) for CITIIS 1.0.
- Technical assistance was made available under the program at all three levels through domestic experts, international experts, and transversal experts.

Nyaya Vikas Portal

Nyaya Vikas portal was created for monitoring the implementation of Centrally Sponsored Scheme for Judicial Infrastructure.

Centrally Sponsored Schemes for Judicial Infrastructure

- The primary responsibility of development of infrastructure facilities for judiciary rests with the **State Governments**.
- To augment the resources of the State Governments, the Union Government has been implementing a Centrally Sponsored Scheme.
- **Aim** - It aims for the *development of Infrastructure Facilities* for Judiciary by providing financial assistance to State Governments / UTs in the prescribed fund sharing pattern between Centre and States.
- It covers the construction of court buildings and residential accommodations for Judicial Officers of District and Subordinate Judiciary.
- **Outlay** - Centrally Sponsored Scheme (CSS)
- **Ministry** - Ministry of Law and Justice
- **Year** - The scheme being implemented since 1993-94.
- **Fund Sharing**
 - **States** - 60:40 for States other than North Eastern and Himalayan States.
 - **For North Eastern and Himalayan States** - 90:10
 - **For Union Territories (U.T)** - 100% centrally funded
- For monitoring the status of the projects 3 broad monitoring mechanisms have been provided.
 1. High Court Level Monitoring Committee at State level
 2. Central Level Monitoring Committee in the Department of Justice, required to meet every 6 months
 3. Nyaya Vikas Online monitoring system.
- **Nyaya Vikas Portal** – It is a digital platform to monitor the Centrally Sponsored Scheme for Development of Infrastructure for Judiciary.

Manual Scavenging

Ministry of Social Justice and Empowerment report says that only 66% districts in country is free of manual scavenging.

- The International Labour Organization describes 3 forms of manual scavenging in India
 1. Removal of human excrement from public streets and dry latrines (meaning simple pit latrines without a water seal, but not dry toilets in general),

2. Cleaning septic tanks,
 3. Cleaning gutters and sewers.
- India banned the practice under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 (PEMSR).
 - In 2013, the definition of manual scavengers was also broadened to include people employed to clean septic tanks, ditches, or railway tracks.
 - The Act recognizes manual scavenging as a *dehumanizing practice* and cites a need to correct the historical injustice and indignity suffered by the manual scavengers.

Self-Employment Scheme for Rehabilitation of Manual Scavengers (SRMS)

- It was introduced in 2007.
- **Objective** - To rehabilitate the remaining manual scavengers and their dependents in alternative occupations by March, 2009.
- **Ministry** - Ministry of Social Justice & Empowerment (MoSJE).
- The scheme for rehabilitation of manual scavengers (SRMS) has now been merged with the NAMASTE scheme.
- The FY 2023-24 Union Budget showed no allocation for the rehabilitation scheme and Rs. 100 crore allocation for the NAMASTE scheme.

National Action for Mechanized Sanitation Ecosystem (NAMASTE) Scheme

- It is a central sector scheme for improving the living standards of sanitation workers in urban areas.
- It is a joint initiative of Ministry of Social Justice and Empowerment (MoSJE), Ministry of Housing and Urban Affairs (MoHUA) and Department of Drinking Water and Sanitation.
- **Objectives** - It envisages safety and dignity of sanitation workers in urban India by
 - Recognising sanitation workers as one of the key contributors in the maintenance of sanitation infrastructure
 - Providing them with sustainable livelihood
 - Enhancing their occupational safety through capacity building and improved access to safety gear and machines
 - It aims at provide alternative livelihoods support and entitlements to reduce their vulnerabilities.

Mission on Advanced and High-Impact Research (MAHIR)

The Ministry of Power and the Ministry of New and Renewable Energy have jointly launched a National Mission - MAHIR

- **Aim** - To facilitate indigenous research, development and demonstration of the latest and emerging technologies in the power sector.
- **Ministry** - Ministry of Power and the Ministry of New and Renewable Energy.
- **Fund** - Funds will be given by Ministry of Power, Ministry of New and Renewable Energy and the Central Public Sector Enterprises under 2 Ministries.
- Planned for an initial period of 5 years from 2023-24 to 2027-28.
- The Mission will follow the technology life cycle approach of Idea to Product.

Indian power sector is going to grow at more than 7% in coming years against the increase in the electricity demand close to 10%.

Areas Identified for Research

- | | |
|---|---|
| <ul style="list-style-type: none">• Alternatives to Lithium-Ion storage batteries• Modifying electric cookers / pans to suit Indian cooking methods• Green hydrogen for mobility (High Efficiency Fuel Cell)• Carbon capture | <ul style="list-style-type: none">• Geo-thermal energy• Solid state refrigeration.• Nano technology for EV battery• Indigenous CRGO technology |
|---|---|

Fame -II Subsidy Cut

The government has reduced the subsidy provided under FAME-II scheme applicable on electric two-wheelers registered on or after June 1, 2023.

FAME INDIA Scheme

- The Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME) scheme was launched in 2015.
- **Aim** - It is to support hybrid/electric vehicles market development and Manufacturing eco-system.
- **Ministry** – Ministry of Heavy Industries.
- It is a part of National Electric Mobility Mission Plan.
- The incentive is linked to battery capacity of e-vehicles with a cap 20% of the cost of vehicle.

FAME II

- The scheme was commenced on April 2019 for a period of 3 years.
- Incentive cap increased from 20% to 40% of the capital cost of the e-2W.
- Only advanced battery and registered vehicles will be incentivized under the scheme.
- In 2022, it was further extended for a period of 2 years up to March 31, 2024.

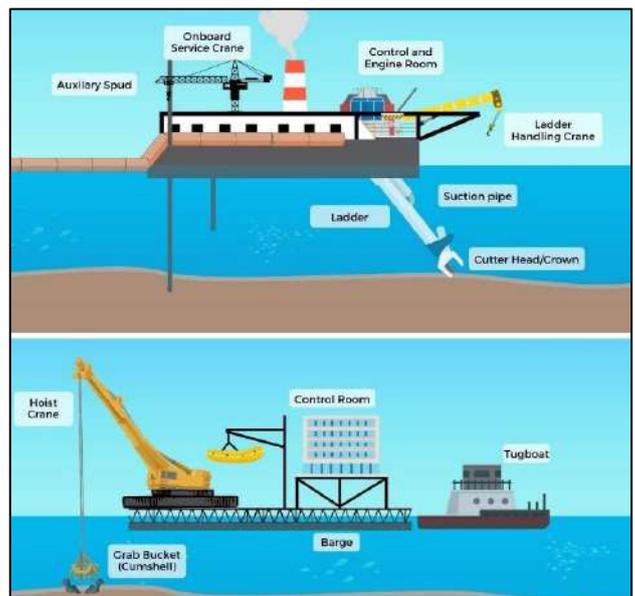
Recent Notification

- The government has reduced the subsidy provided under FAME-II scheme applicable on electric two-wheelers registered on or after June 1, 2023. The cap on incentives for electric two-wheelers will be 15% of the ex-factory price of vehicles from 40% at present.
- For electric two-wheelers, the demand incentive will be Rs 10,000 per kWh.

Sagar Samriddhi

Union Minister launched 'SAGAR SAMRIDDHI' to bring transparency & efficiency.

- Sagar Samriddhi is an Online Dredging Monitoring System to bring transparency & efficiency.
- **Aim** – To carry out dredging to accelerate 'Waste to Wealth' campaign of Ministry of Ports, Shipping and Waterways (MoPSW).
- **Dredging** - Dredging is the removal of sediments and debris from the bottom of lakes, rivers, harbours, and other water bodies.
- It is developed by National Technology Centre for Ports, Waterways and Coasts (NTCPWC) the technological arm of MoPSW.
- **Ministry** - Ministry of Ports, Shipping and Waterways (MoPSW).
- The new technology brings in marked improvement against the old system of Draft & Loading Monitor (DLM) system.
- To address the objective of carrying out dredging, the MoPSW issued 'Dredging Guidelines for Major Ports' in 2021.
- **Waste to wealth** is a mission by the government to identify, develop and deploy technologies to treat waste to generate energy, recycle materials and extract worth.



National Technology Centre for Ports, Waterways and Coasts (NTCPWC)

- It was established under the Sagarmala Programme of MoPSW.
- **Aim** - To enable research & development for the marine sector, enabling solutions towards achieving the ultimate goal of building a robust marine industry in the country.

- Technological arm of the Ministry of Shipping, provides scientific support to ports, IWAI, and other institutions.
- This state-of-the-art centre has world class capabilities for undertaking the 2D & 3D investigations of research and consultancy nature for the Port, Coastal, and Waterways sector.

Shakti Scheme

Karnataka government has recently launched the Shakti scheme

- Sakthi Scheme offers free travel to women and transgender people in government-run buses in the state of Karnataka.
- The scheme allows women and transgenders irrespective of their age.
- It aims to empower women financially by providing them free of cost bus service.
- The government has also reserved 50% of the seats for men in all RTCs, except BMTC services.
- The scheme follows the footsteps of Delhi, Punjab and Tamil Nadu, which have introduced similar initiatives.

PM- KISAN

Recently, face authentication feature is enabled in PM-Kisan mobile app expansion.

- It is a Central Sector scheme with 100% funding from Government of India.
- **Launch Year** - 2018.
- **Ministry** – Ministry of Agriculture and Farmers welfare.
- **Features** - Under this scheme an income support of 6,000/- per year in 3 equal instalments will be provided to all land holding farmer families (subject to exclusion criteria).
- Under the PM Kisan scheme, the farmer can also get a loan facility in the form of short-term loans by using Kisan Credit Card (KCC).
- Definition of family for the scheme is husband, wife and minor children.
- **Identification of Beneficiaries** - State Government and UT administration will identify the farmer families which are eligible for support as per scheme guidelines.
- The fund will be directly transferred to the bank accounts of the beneficiaries.
- It has roped in India Post Payment Bank (IPPB) to open Aadhaar linked bank accounts for beneficiaries at their doorstep and asked Common Services Centres to organize village-level e-KYC camps with the help of States/UTs.

PM-KISAN Mobile App

- It is developed and designed by the National Informatics Centre in collaboration with the Ministry of Electronics and Information Technology.
- The farmers can view the status of their application, update or carry out corrections of their Aadhaar cards and also check the history of credits to their bank accounts.
- **Face authentication feature** will enable beneficiary farmers to complete their e-KYC process by just scanning their face on mobile phones instead of using one-time password or fingerprints.
- It is the first government scheme to have this feature.

SECURITY

Suspension of Operations (SoO) pact

Union Home Minister Amit Shah, warned that any further violation by insurgent groups would be considered a violation of the SoO agreement. **Suspension of Operations (SoO) pact**

- It is a tripartite agreement between the Government of India, State Governments and the insurgent groups.
- There are nearly 30 Kuki insurgent groups in Manipur, of which 25 are under the tripartite Suspension of Operations (SoO) pact.

- As many as 17 are under the umbrella group Kuki National Organisation (KNO), and eight are under the United People's Front (UPF).
- The pact was signed in August 2008, with the primary objective of *initiating political dialogue*.
- **AB Mathur**, former special secretary of the Research and Analysis Wing (RAW), was the interlocutor for this agreement.
- The Kuki outfits who were initially demanding a separate Kuki state have come down to a Kukiland territorial council.
- **Kuki Territorial Council** – It would have financial and administrative powers independent of the Manipur Assembly and government.

Terms of the SoO Pact

- While the period of the Suspension of Operation agreement is 1 year, it is extendable according to the progress of its implementation.
- To oversee the effective implementation of the SoO pact, a committee called the **Joint Monitoring Group (JMG)**, with representatives from all the signatories, has been formed.
- According to the pact, the Centre and state governments agreed that the security forces would not launch any operations against these groups.
- In return, the insurgent groups will also not launch any such operation.
- The pact also requires these groups to abide by the Constitution of India, the laws of the land and the territorial integrity of Manipur.

Meira Paibis

The Meira Paibis deliberately blocking routes and interfering in Operations of Security Forces during critical situations to save lives and property.

- The Meira Paibis, also known as *Imas or Mothers of Manipur*, are Meitei women who come from all sections of the society.
- They are loosely organised, usually led by groups of senior women and are widely respected, and represent a powerful moral force.
- They have no rigid hierarchy or structure, or any overt political leanings.
- They are called women torch bearers because of the flaming torches that they hold aloft while marching in the streets, often at night.
- **Formation** - It was formed in 1977.
- **Aim** - Its initial focus is to fight alcoholism and drug abuse.
- It has now expanded to countering human rights violations and the development of society at large.
- **Leadership** - Every *Leikai* (colony) in Imphal City has a group of Meira Paibis.
- The eldest of each group becomes its leader.

Movements by Meira Paibis	
•	In 1904, they protest against the Lallup system by which men were required to perform 10 days of free labour every 30 days.
•	In 1939, they protest against the Maharaja's economic policies.
•	In independent India, every movement in Manipur state on every issue of vital importance such as statehood for Manipur, inclusion of Manipuri in 8th schedule, or ban of alcohol was led by Meira Paibis.
•	More recently, Meira Paibis play the backbone of Irom Sharmila, the activist who remained on a hunger strike from 2000 to 2016 to protest against the Armed Forces Special Powers Act (AFSPA).
•	They performed an active role in 2015 for the Inner Line Permit (ILP).

19. INTERNATIONAL RELATIONS

International Covenant on Civil and Political Rights (ICCPR) Act

Nathasha Edirisooriya, a Sri Lankan standup comic, was arrested under the International Covenant on Civil and Political Rights (ICCPR) Act.

- The ICCPR is a multilateral treaty that deals with human rights. The Act was adopted by the United Nations (UN) General Assembly on 1966 and came into force in 1976.
- The Covenant respects civil and political *rights of individuals*, including right to life, freedom of religion, freedom of speech, freedom of assembly, electoral rights, and rights to due process and a fair trial.
- The ICCPR is part of the International Bill of Human Rights, along with the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the Universal Declaration of Human Rights (UDHR).
- **Monitoring Authority** - The *UN Human Rights Committee* reviews regular reports by state parties on how human rights are being implemented.
- Today, the covenant has 173 parties and 6 more signatories without ratification.
- India ratified this treaty in 1979.

Section 3 of the ICCPR Act

- The section is based on Article 20 of the ICCPR.
- A section that has been used time and time again to restrict freedom of expression.
- The section prohibits the propagation of war or advocacy of national, racial or religious hatred that constitutes incitement to discrimination, hostility or violence.
- Offences under this section are cognizable as well as non-bailable.

Memorial wall for fallen United Nations peacekeepers

India's Permanent Representative to the UN Ambassador Ruchira Kamboj introduced the draft resolution titled 'Memorial wall for fallen United Nations peacekeepers' in the UN General Assembly hall.

- **Memorial Wall** - The UN General Assembly has adopted a draft resolution introduced by India to establish a memorial wall in the UN Headquarters to honour fallen peacekeepers.
- The resolution was submitted by 18 countries including Bangladesh, Canada, China, Denmark, Egypt, France, India, Indonesia, Jordan, Nepal, Rwanda and the U.S.
- The resolution was co-sponsored by nearly 190 UN Member States and was adopted by consensus.
- In 2015, the Permanent Mission of India to the UN launched a *virtual memorial wall*, dedicated to the Indian troops who made the supreme sacrifice while doing active service as UN peacekeepers.
- The initiative was a precursor to the eventual construction of the Peacekeepers Memorial Wall.
- It is an appropriate way to commemorate all the troops from UN member states who had given their lives while on duty under the Blue Flag of the United Nations.
- **India's Contribution to UN Peacekeeping** - India is currently the **3rd largest contributor** of uniformed personnel to UN Peacekeeping with more than 6,000 military and police personnel.
- About 177 Indian peacekeepers have made the supreme sacrifice, the highest number by far from any troop-contributing country.



Minerals Security Partnership

India joins US-led Mineral Security Partnership (MSP) recently.

- **Launch** - 2022.
- It is a US-led collaboration of countries that includes Australia, Canada, Finland, France, Germany, Japan, the Republic of Korea, Sweden, UK, the European Commission, Italy, and now India.
- It is also known as the critical minerals alliance.
- **Aim** - To ensure that critical minerals are produced, processed and recycled in a way that helps countries secure a stable supply of critical minerals for their economies.
- The focus is primarily on the supply chains of critical minerals such as cobalt, nickel, lithium and the 17 "rare earth" minerals.

DID YOU KNOW?

India and Australia decided to strengthen their partnership in the field of projects and supply chains for critical minerals under the Australia-India Critical Minerals Investment Partnership.

- **Objectives**

- Strengthened information sharing between partner countries
- Increased investment in secure critical minerals supply chains
- Develop recycling technologies

Critical minerals

- **Critical minerals** - A critical mineral is a *metallic* or *non-metallic* element that is essential for the functioning of our modern technologies, economies or national security and there is a risk that its supply chains could be disrupted.
- Many critical minerals, including rare earth minerals and metals such as lithium, gallium, tellurium, and indium, are central to high-tech sectors.
- **The major critical minerals** - Graphite, lithium and cobalt are used for making semiconductors, high-end electronics manufacturing, fighter jets, drones, and radio sets.
- **Rare earth minerals** – Rare earth minerals are a set of 17 metallic elements, which includes scandium, yttrium, and the 15 lanthanides.
- **Examples** - Lanthanum, cerium, neodymium, praseodymium and samarium, dysprosium, terbium, europium.
- It is used a wide range of applications such as cellular telephones, flat-screen monitors and televisions, and electric vehicles.
- **Top producers** – According to the International Energy Agency, the major producers of critical minerals are *China, Congo, Chile, Indonesia, South Africa, and Australia*.
- China has global dominance in terms of processing.

Chip 4 Initiative

US, Japan, South Korea and Taiwan has launched a forum to cut off chips to China.

- Chip 4 Initiative includes world's top semiconductor producing countries namely the **U.S., Japan, Taiwan, and South Korea**.
- It is also known as "**Fab 4**" initiative. (Fab refers to an industry term for the fabrication plants).
- **Objectives**
 - Support industry efforts to diversify their manufacturing base away from China
 - Protect Intellectual property of companies in member countries
 - Develop policy regarding export of the most advanced semiconductors and equipment
- **Taiwan** – It is the global epicenter of semiconductor manufacturing with the manufacture of over 60% of the world's chips.
- **Japan** – It is dominant in production of critical manufacturing equipment and materials such as photoresists.
- **South Korea** is a global leader in memory chip production.
- Related links – [Producing a Perfect Semiconductor Chip](#)

India, Japan and Australia had announced plans in 2021 to establish a semiconductor supply chain initiative

BILATERAL RELATIONS

Nepal PM visit to India

Nepal and India renewed the Transit Treaty, signed deals in energy and Connectivity

- **Transit treaty** - Under this, the contracting parties shall accord the *freedom of transit* across their respective territories through routes mutually agreed upon.

Mahakali Treaty has been signed in 1996 for Integrated Development of Mahakali River (known as **River Sarda** in India), including Sarda Barrage, Tanakpur Barrage & Pancheshwar

- The treaty of transit between India & Nepal expired in 2019.
- The amended new treaty will allow Nepal *to access India's inland waterways* for cargo transportation to sea ports.
- **Hydro Power Projects** – Currently, India exports around 452 MW of power from Nepal.
- India had agreed to import an additional 1,200 MW.
- India has agreed to facilitate export of hydropower from *Nepal to Bangladesh through India*.
- **Pancheshwar Multipurpose Project** – It is a hydropower project to be developed in *Mahakali River* bordering Nepal and India.
- The project is covered under integrated Mahakali Treaty signed between India & Nepal.
- **Power trade** – India and Nepal had also signed a long-term power trade agreement.
- Under this agreement, India will import 10,000 MW of power from Nepal in the next 10 years.

Upcoming projects with Nepal	River
Pancheshwar Multipurpose Project	River Sarda
Saptakoshi and Sun-Kosi Storage project	River Kosi
Naumere Multipurpose Project	River Rapti
Kamla Dam Multipurpose Project	River Kamla
Bagmati Multipurpose Project	River Bagmati

India-U.S. Strategic Trade Dialogue (IUSSTD)

India and the U.S. pledged to streamline their export control regimes for critical technologies at the inaugural India-U.S. Strategic Trade Dialogue (IUSSTD).

- It is an initiative on Critical and Emerging Technologies (iCET) between India and U.S.
- It focused on ways in which both the governments can facilitate the development and trade of technologies in critical domains.
- **Critical Domains** - Semiconductors, space, telecom, quantum, AI, defence, biotech and others.
- Both sides agreed to enhance awareness among the industry, academia and other stakeholders about the export control regimes through workshops and other activities.
- **Monitoring Group** - They agreed to set up a regular monitoring group which will review progress in deepening cooperation in the bilateral high-tech trade and technology partnership.
- They agreed to continue the dialogue with the objective of strengthening the India-US Comprehensive Global Strategic Partnership.

INTERNATIONAL ORGANISATIONS

Hiroshima AI Process (HAP)

The annual Group of Seven (G7) Summit, hosted by Japan, took place in Hiroshima initiated the Hiroshima AI process (HAP)

- HAP is an effort by G7 countries to determine a way forward to regulate artificial intelligence (AI).
- Hiroshima AI process (HAP) made a plan for ministers from the respective countries to meet by the end of the year to establish common rules on **promoting trustworthy AI**.
- HAP will work in cooperation with the OECD and Global Partnership on Artificial Intelligence (GPAI) will discuss on generative AI by the end of this year.

Global Partnership on AI (GPAI)

- It is an international initiative to support responsible and human-centric development and use of Artificial Intelligence (AI).
- **Aim** - To bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities.
- It built around a shared commitment to the OECD Recommendation on Artificial Intelligence.
- GPAI is a group of 25 member countries.
- **India** joined the group as a *founding member* in 2020.

- It brings together engaged minds and expertise from science, industry, civil society, governments, international organisations and academia to foster international cooperation.

G7 (Group of 7)

- It is an intergovernmental economic group consisting of 7 largest IMF advanced economies such as Canada, France, Germany, Italy, Japan, the UK, and the US.
- EU is also represented within the G7 as an invitee.
- These countries are the 7 major advanced economies as reported by the IMF.
- Formerly called *G8* with *Russia* in it, but due to Crimean crisis, Russia was ejected from the group.
- G7 summit is being held *annually* to discuss economic policies, while the G7 finance ministers have met at least semi-annually.
- It has *no binding impact* on policy, and all decisions and commitments made at G7 meetings need to be ratified independently by governing bodies of member states.
- **India's membership** - India is a ***not a member of G7***.
- **Chair of 2023, G7** – Japan.



NATO Plus

American Senator has said that the plans to introduce a bill to make India part of the NATO Plus grouping.

- It is a security arrangement that brings together the grouping of the North Atlantic Treaty Organization (NATO) and 5 countries - Australia, New Zealand, South Korea, Japan and Israel.
- It was formalized in 2019.
- **Aim** - To boost defence and intelligence ties.
- **Benefits if India is added**
 - It would facilitate seamless intelligence sharing between these countries and India.
 - It would access the latest military technology without much of a time lag.
 - It would enhance the ties between U.S. and India.

North Atlantic Treaty Organization (NATO)

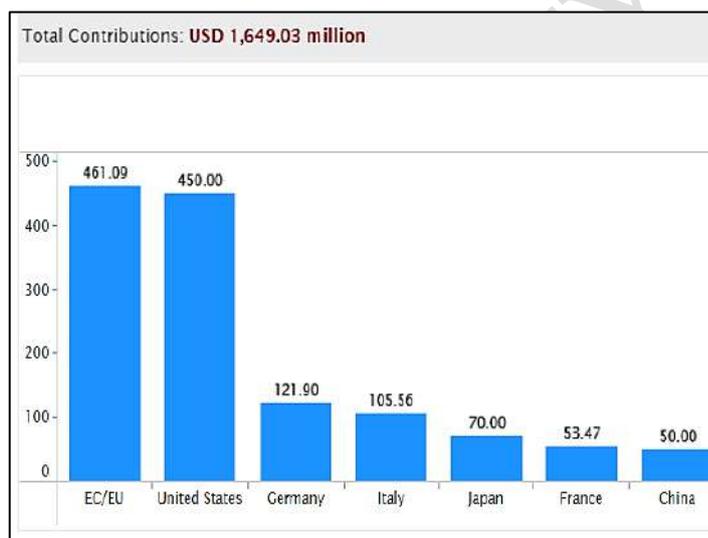
- It is a *31-member alliance*, with 29 European nations, and two American nations (United States and Canada).
- It was set up in 1949 by the US, Canada and several Western European nations to provide collective security against the Soviet Union.
- **Aim** - To protect peace and to guarantee the territorial integrity, political independence and security of the member states.
- It was the US's first peacetime military alliance outside the western hemisphere.
- **Headquarters** - Brussels, Belgium.
- Collective defence is laid out in *Article 5 of the North Atlantic Treaty* in which members of NATO are committed to mutual defence in response to an attack by any external party.
- India is *not a part* of NATO because it is a firmly non-aligned country and stakes its international reputation on remaining non-aligned.
- Membership is open to *any other European state* in a position to further the principles of this Treaty and to contribute to the security of the North Atlantic area.
- Finland has become the 31st member of the alliance.

	NATO
Founded in	1949
Headquarters	Brussels, Belgium
India's membership	India is a not member

The Pandemic Fund

India is believed to have placed a funding request of around \$55 million in its first call with the Pandemic Fund of the World Bank.

- Pandemic Fund is a multi-stakeholder global partnership officially established in November, 2022.
- It is one of the Financial Intermediary Fund (FIF).
- It is a collaborative partnership among donor countries, co-investors (countries that are eligible to receive funding), foundations and civil society organizations (CSOs).
- **Objective** - It will provide a dedicated stream of additional, long-term financing to strengthen critical pandemic Prevention, Preparedness, and Response (PPR) capabilities in low- and middle-income countries.
- **Governing Structure**
 1. Governing Board
 2. Technical Advisory Panel
 3. Secretariat - The World Bank
 4. Trustee - The World Bank
- **Funding** - The financial volume of The Pandemic Fund depends upon contributions from donors.
- **Founding financial contributors** - Australia, Canada, China, European Commission, Germany, Indonesia, Italy, Japan, Republic of Korea, New Zealand, Norway, Singapore, Spain, United Arab Emirates, United States, Bill and Melinda Gates Foundation, Rockefeller Foundation, Wellcome Trust.



Financial Intermediary Fund (FIF)

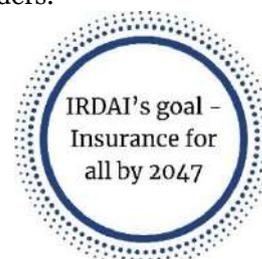
- They provide independently governed multi-contributor collaboration platforms for the global community.
- It focuses on specific themes and each FIF is a type of trust fund for which the **World Bank** serves as trustee.
- **Examples** : Adaptation Fund, The Pandemic Fund, Global Environment Facility, Green Climate Fund, etc.,
- FIF Trusteeship does not involve overseeing or supervising the use of funds.

20. ECONOMY

Bima Sugam

IRDAI has set up a 24-member committee to synergise Bima Vahak, Bima Vistaar and the digital platform - Bima Sugam.

- **Bima Sugam** - It is a one-stop online portal for all insurance related queries, policy purchase, claim settlement and insurance advice.
- Web aggregators, brokers, insurance agents, bank agents, etc. would act as facilitators for selling insurance policies.
- The portal would provide all such facilities to policyholders having an e-insurance account (E-IA).
- Several insurance companies (both general and life insurers) would become major shareholders.
- **Bima Vahak** - It is a dedicated distribution channel by the IRDAI to reach out to every Gram Panchayat.
- Each Gram Panchayat would have a 'Bima Vahak' who would be tasked to sell and service simple parametric bundled insurance products.
- Bima Vahak intends to form a women-centric insurance distribution channel.



- The initiative will foster greater trust and build awareness about insurance products in the rural areas of India.
- The activities of Bima Vahak ranges from collection of proposal information, KYC documents and submissions to coordination and support in policy and claims-related servicing.
- However, the insurer will remain responsible for ensuring KYC and Anti-Money Laundering compliance with respect to the policies sourced through the Bima Vahaks.
- **Bima Vistaar** - It will target the untapped geographies and provide a social safety net for rural population.
- It aims to develop and suggest an affordable, accessible, and comprehensive cover for the rural population.
- It is currently under processing and is going to be launched on the insurance regulator's pet project Bima Sugam.

Variable Rate Reverse Repo (VRRR)

Despite having surplus liquidity, there was muted response from banks to the Variable reverse repo (VRRR) auction that recently held by RBI.

Repo Rate	Reverse repo rate	Variable Rate Reverse Repo
<ul style="list-style-type: none"> • The rate at which the <u>RBI issues loans to commercial banks</u> when there is a shortage of funds is the repo rate. • It is used by monetary authorities to control inflation. • Current repo rate announced by monetary policy committee is 6.50%. 	<ul style="list-style-type: none"> • It is the variable or fixed interest rate the <u>RBI pays to commercial banks</u> when they store excess cash reserves with the central bank. • It is a monetary policy instrument which can be used to control the money supply in the country. • Current reverse repo rate is at 3.35%. 	<ul style="list-style-type: none"> • A reverse repo is a fixed or variable interest rate at which <u>banks lend to RBI</u>. • It is the subdivision of reverse repo. • The VRRR auction is undertaken to reduce surplus liquidity in the system by withdrawing existing cash.

Default Loss Guarantee (DLG)

The Reserve Bank of India (RBI) has allowed default loss guarantee (DLG), a safety-net arrangement in the digital lending space.

- DLG is also known as First Loss Default Guarantee (FLDG).
- It is an arrangement whereby a third party such as a financial technology (fintech) player, also known as Lending service providers (LSP), compensates lenders if the borrower defaults.

Lending service providers (LSP)

- LSPs are new-age players who use technology platforms in the lending space.
- They are agents of a bank or NBFC who carry out one or more of a lender's functions (in part or full).
- They perform in customer acquisition, underwriting support, pricing support, disbursement, servicing, monitoring, recovery of specific loan or loan portfolio on behalf of Regulated Entities (RE).
- The LSP provides certain credit enhancement features such as first loss guarantee up to a pre-decided percentage of loans generated by it.
- For all practical purposes, credit risk is borne by the LSP without having to maintain any regulatory capital.

Recent Notification of RBI

- The RBI, after examining FLDG, permitted the arrangements between banks and fintechs or between two regulated entities (REs).
- The central bank said an RE can enter into DLG arrangements only with an LSP or other REs with which it has entered into an outsourcing (LSP) arrangement.
- The LSP-providing DLG must be incorporated as a company under the Companies Act, 2013.
- The RBI has allowed banks to accept DLG in digital lending only
 - if the guarantee is in the form of a cash deposit, or fixed deposits in a bank with a lien in favour of the RE, or
 - a bank guarantee in favour of the RE.

- Banks and NBFCs should ensure that the total amount of DLG cover on any outstanding portfolio does not exceed 5% of the amount of that loan portfolio.

Wilful Defaulters

The Reserve Bank of India (RBI) has allowed wilful defaulters and loans accounts involved in frauds to go in for a compromise settlement with banks to settle their dues.

- **Wilful defaulter** - A wilful defaulter is an entity or a person that has not paid the loan back despite the ability to repay it.
- A fraudster is one who intentionally cheats the bank with false documents/information and misappropriates the money.
- As per the RBI regulations, wilful default covers several broad areas:
 - Deliberate non-payment of the dues despite adequate cash flow and good network,
 - Tapping off of funds to the detriment of the defaulting unit,
 - Assets and proceeds have been misutilised;
 - Misrepresentation / falsification of records;
 - Disposal / removal of securities without bank's knowledge;
 - Fraudulent transactions by the borrower.
- The amount of wilful default must be of **at least Rs. 25 lakhs** as per the Central Vigilance Commission.
- Restrictions for wilful defaulters
 - Barred from participating in the capital market.
 - Barred from availing of banking facilities for 5 years to start a new venture.
 - Lenders are free to initiate the process of recovery with full ferocity and may initiate criminal proceedings.
 - Lending institutions do not allow any wilful defaulter to become a board member of any company.
 - Barred from making an open offer.

Open Market Sale Scheme (OMSS)

The Centre has discontinued the sale of rice and wheat from the central pool under the Open Market Sale Scheme (OMSS) to State governments.

- It is a government initiative to sell surplus stocks of wheat and rice under at pre-determined prices through e-auction in the open market.
- **Conducted by** – Food Corporation of India, Ministry of Consumer Affairs, Food and Public Distribution.
- In addition to maintaining buffer stocks and making a provision for meeting the requirement of the Targeted Public Distribution Scheme (TPDS) and other welfare schemes, FCI sells wheat and rice in the open market from time to time.
- **Aim** - To enhance the supply of food grains during the lean season and thereby moderate the open market prices especially in the deficit regions.
- The FCI conducts a weekly auction using the platform of commodity exchange NCDEX (National Commodity and Derivatives Exchange Limited).
- The State Governments/ Union Territory Administrations are also allowed to participate in the e-auction, if they require wheat and rice outside Targeted Public Distribution System (TPDS).
- The present form of OMSS comprises 3 schemes as under:
 - Sale of wheat to bulk consumers/private traders through e-auction.
 - Sale of wheat to bulk consumers/private traders through e-auction by dedicated movement.

Reason for discontinuation			
To control inflation	price	To streamline distribution channels	
To ensure stability	price	To make flexibility in response to market conditions	
To balance levels	stock	To promote market competition	

- Sale of Raw Rice Grade 'A' to bulk consumers/private traders through e-auction.
- **Potential impacts**
 - It will have implications for food security and price stability in some regions.
 - It will impact certain states including Karnataka that provide free grains to the poor.

Multi-cap Funds

Multi-cap funds with equity exposure of 25% each in the large-, mid- and small-caps have delivered better returns in the last few years.

- Multi Cap Funds invest their corpus in a portfolio of equity and equity-related stocks of companies with varying market capitalizations.
- Their portfolio comprises of large cap, midcap and small cap stocks.
- Multi-cap funds allocate 75% of the fund assets to equities and related instruments, with **at least 25%** in each of the large, medium, and small capitalizations as per the SEBI mandate.
- They are relatively less risky compared to a pure mid cap or a small cap fund but are riskier than those of large cap funds.
- **Types of Multi-Cap Funds**
- **Large cap** – It refers to the top 100 publicly listed companies in India by full market capitalization
- **Mid cap** – It refers to the 101st to 250th company in terms of full market capitalization
- **Small caps** - 251st company onwards in terms of full market capitalization.

Market capitalization = No. of publicly listed shares x Price of each share

Advantages of Multi Cap Funds

- Exposure to all key sectors driving the Indian economy forward
- Ideal for an investment horizon of 5+ year
- Eliminates the need for buying different funds for comprehensive market coverage
- Provide a perfect blend of all capital markets that allows to earn good interest balancing the risks and returns.

National Company Law Appellate Tribunal (NCLAT)

Google has filed an appeal in the Supreme Court against a verdict by the National Company Law Appellate Tribunal (NCLAT) where it upheld a penalty imposed for its anti-competitive conduct in the Android ecosystem.

- NCLAT was constituted under Section 410 of the Companies Act, 2013 for hearing appeals against the orders of National Company Law Tribunal(s) (NCLT).
- **Enacted on** - 2016.
- **Constituted by** – Ministry of Corporate Affairs
- **Objectives**
 - It hears appeals against the orders passed by NCLT(s) under Insolvency and Bankruptcy Code, 2016 (IBC).
 - It hears appeals against the orders passed by Insolvency and Bankruptcy Board of India.
 - It hears and dispose of appeals against any direction issued or decision made or order passed by the Competition Commission of India (CCI).

National Company Law Tribunal (NCLT)

- It is a quasi-judicial body in India incorporated for dealing with corporate disputes that are of civil nature arising under the Companies Act.
- NCLT is obliged to objectively determine facts, decide cases in accordance with the principles of natural justice and draw conclusions from them in the form of orders.
- NCLT is obliged to objectively determine facts, decide cases in accordance with the principles of natural justice and draw conclusions from them in the form of orders.

- It is also the Appellate Tribunal to hear and dispose of appeals against the orders of the National Financial Reporting Authority.
- The President of the Tribunal, chairperson and Judicial Members of the Appellate Tribunal, shall be appointed after consultation with the Chief Justice of India.
- **Chairperson** - A person who is or has been a Judge of the Supreme Court or the Chief Justice of a High Court.
- **Term** - 5 years, eligible to be reappointed.
- A person who is/has been a judge of a High Court for at least 5 years is eligible for becoming the President of the NCLT.
- An advocate of a court for at least 10 years, shall be eligible for becoming a Judicial Member.
- No civil court has the right to entertain any provision regarding NCLT or NCLAT.
- NCLT and NCLAT are judicial tribunals that exercise the jurisdiction previously vested on the High Courts.

Petroleum Coke (Pet Coke)

Government permits import of pet coke as raw material for lithium-ion batteries.

- Petcoke is a by-product created when bitumen found in tar sands, is refined into crude oil.
 - Bitumen is a sticky, black, highly viscous liquid or semi-solid form of petroleum.
- It is a carbon-rich solid material derived from a thermo-based chemical engineering process.
- It is a spongy, solid residue from oil distillation that can be burned for fuel similar to coal.
- The process splits long chain hydrocarbons of petroleum into shorter chains that takes place in coker units.
- There are two distinctive grades of Petroleum Coke viz. Calcinable or Green Petcoke and Fuel Grade Petcoke.
- **Production** – Calcinable grade coke or Green Petcoke, also referred as RPC is produced at Koyali, Barauni, Bongaigaon, Digboi and Guwahati refineries of IndianOil.
- Fuel Grade Petcoke is produced at Panipat, Paradip, Koyali and Haldia refineries of IndianOil.
- Petcoke, a by-product from oil refining and a substitute for coal is referred by India due to the surge in the global prices of coal.
- The ongoing Russia-Ukraine war resulted in a hike in the price of commodities such as coal, and crude oil.
- Indian firms are also buying Petcoke from Venezuela because the country is offering the same at a discounted rate of 5-10% lower than the US.
- The world's biggest consumer of Petcoke, India imports over half of its annual Petcoke from the US which is around 27 million tonnes.
- **Applications** – It is used as a feed stock or for fuels and is used in making cement, lime kilns, gasification units, and industrial boilers.
- It is used as a carbon source in Electrodes for electrometallurgical industries, Synthetic Graphite, Aluminium Anodes, TiO₂ pigments, Carbon Raiser.
- Difference between Coke and Coal:

Coke	Coal
Charcoal is a type of fuel created when the wood is burned incompletely.	When burned, coal is a glossy, black fossil fuel that contains impurities, produces smoke, and produces less heat than coke.
Coke is a carbon-based fuel manufactured from calcined or dry-distilled mineral coal.	Coal is a soiled, black coal waste that burns hotter and cleaner than regular coal.
It is carbon-based and has a high calorific value.	Coal is not a renewable resource.
It is used as a fuel in steel foundries' blast furnaces.	It is commonly used to generate electricity.

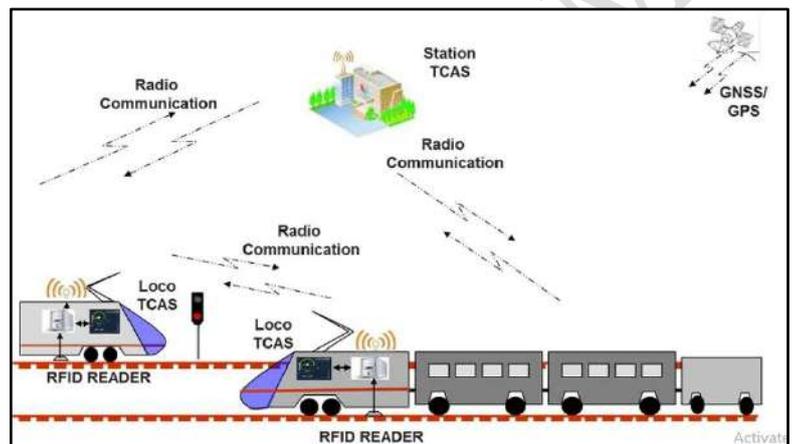
Kavach System

In the recent happening of Odisha train accident, the KAVACH system is not installed in the mishaped trains.

- It is an indigenously developed Automatic Train Protection (ATP) system by the Research Design and Standards Organisation (RDSO) in collaboration with the Indian industry.
- It is a state-of-the-art electronic system with Safety Integrity Level-4 (SIL-4) standards.
- **SIL Standards** – Safety Integrity Level (SIL) is a measure of the reliability of the safety function performing to specification.
- 4 SILs are defined - SIL 4 the most dependable and SIL 1 the least.
- **Objective** - To provide protection by preventing trains to pass the signal at Red and avoid collision.
- It activates the train's braking system automatically if the driver fails to control the train as per speed restrictions.

Working of Kavach

- Traffic collision avoidance system (TCAS) is equipped with on board the locomotive and transmission towers at stations.
- It is connected with [Radio Frequency Identification \(RFID\) tags](#), helps in two-way communication between the station master and loco-pilot to convey any emergency message.
- The instrument panel inside the cabin helps the loco-pilot know about the signal in advance without visual sighting, and the permissible speeds to be maintained.
- If a red signal is jumped and 2 trains come face to face on the same line, the technology **automatically** takes over and applies sudden brakes.
- Additionally, the hooter activates by itself when approaching a level crossing which serves as a big boon to loco-pilots during fog conditions when visibility is low.
- The system also relays SoS messages during emergency situations.
- An added feature is the centralised live monitoring of train movements through the Network Monitor System.



Electronic interlocking (EI) System in Railways

A change made in the electronic interlocking and point machine led to the recent train accident in Odisha.

Interlocking

- It is an integral part of railway signalling that controls the movement of trains to ensure trains move safely through a controlled area.
- The system is an arrangement of signals and points which operate so that a train can move from one track or junction to another safely, without coming in the way of another train.
- Under the system, signals and points are inter-connected mechanically or electrically or both.

Electronic interlocking (EI)

- It is an advanced signalling, computer-based system that uses electronic components to manage the movement of trains and the configuration of tracks.
- The EI, which is based on software, is designed to prevent 2 trains from running on the same track at the same time.
- It ensures that a train gets a go-ahead only when the route ahead is clear.
- The system is an alternative to the conventional Relay Interlocking system.
- **Components of EI**
 - **Signal** - Based on the status of the track ahead, signals are used to stop, proceed, or exercise caution.

Quick Facts

As of last year, 2,888 stations in India were equipped with an electronic interlocking system — comprising 45.5% of the Indian Railways network.

- **Point switch** - A train can change its track using a point.
- These are movable sections of a track which guide the wheels towards either the straight or diverging track.
- **Track circuit** - These are electrical circuits on tracks to detect the presence of a vehicle or a train on a section of track.
- **Working of EI** - All activities in the signalling system are recorded in a microprocessor-based system called a data logger.
- It acts like the black box of an aircraft and can store and process signal data to generate reports.

21. AGRICULTURE

Direct Seeding Vs Transplanting

Transplanting of Rice

- Transplanting consists of preparing seedlings in nursery and then planting these seedlings in the prepared main field.
- In transplanting, the flooded fields basically deny oxygen to the weed seeds in the soil, thus acting as a natural herbicide.

Direct Seeding of Rice (DSR)

- Paddy is sown directly in the field without any nursery preparation, puddling or flooding.
- DSR is effective against weeds and saves water compared to transplanting.
- It is more cost-effective than transplanting.
- Plants mature faster when grown via direct seeding.
- It is not necessary to disturb root systems when planted via direct seeding.
- **Disadvantages**
 - Higher seed rates
 - Seeds exposed to birds and pests
 - Weed management
 - Higher risk of lodging

Paddy
Origin - South India.
Scientific name - <i>Oryza sativa</i> .
Top producing country – China. 2 nd largest rice producing country – India.
Top producing state in India – West Bengal. Paddy (rice with husk) is a highly water-intensive crop.
Temperature - High temperature above 25-degree Celsius
Rainfall - High humidity with annual rainfall above 100 cm.

	Direct Seeding	Transplanting
Definition	A planting method that involves the sowing of seeds directly in the field or garden.	A planting method that involves the planting of seedlings or whole plants in the field.
Seed Germination	In the germination place	Occurs inside the greenhouse
Maturing of plants	Faster	Slower
Risk	High	Low
Weed Management	Difficult	Easy
Cost	Less Expensive	Expensive compared to direct seeding
Examples	Beans, beets, carrots, melons, peas, radishes	Onion, peppers and tomato

Tobacco Cultivation

Farmers' body questions WHO recommendations on substituting tobacco cultivation with alternative crops.

- *Nicotiana tabacum* and *N. rustica* are the two commonly cultivated for producing commercial tobacco.
- **Origin** - The primary centre of origin of *N. tabacum* is South America and that of *N. rustica* is Peru.
- In India, it is introduced by the *Portuguese* in the 17th century.
- **Area and production** - *N. tabacum* is widely cultivated in most countries of the world while *N. rustica* is restricted to India, Russia and few other Asiatic countries.
- Top production and productivity in India – Gujarat.
- **Other producers** - Andhra Pradesh followed by Gujarat, Karnataka, UP, Bihar, etc.
- **Climate - Mean temperature** - 20° to 27°C.
- **Rainfall** - Not exceeding 1200 mm during the season. It is sensitive waterlogging.
- It is tropical in origin but successfully grown in temperate also.
- **Curing** - It is a carefully controlled process used to achieve the texture, colour and overall quality of a specific tobacco type.
- **Types of Curing** - Flue-cured Tobacco, Air-cured Tobacco, Fire-cured Tobacco, Sun-cured Tobacco.

Tobacco Board

- Statutory body under the Tobacco Board Act, 1975.
- **Headquarters** - Guntur, Andhra Pradesh.
- **Ministry** – Ministry of Commerce and Industry.

The WHO Framework Convention on Tobacco Control (FCTC)

- It is the first global public health treaty on tobacco.
- It is an evidence-based treaty that reaffirms the right of all people to the highest standard of health.
- *India is a party to the convention.*

“ China is the largest tobacco producer in the world followed by India ”

22. ENVIRONMENT

Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP)

The Ministry of Environment, Forest and Climate Change (MoEF&CC), envisages to celebrate the World Environment Day 2023 with a thrust on the Mission LiFE.

EIACP

- The Environmental Information System (ENVIS) came into existence as a plan programme in 1983.
- ENVIS has been subsumed within the revamped scheme of Environment Education, Awareness, Research and Skill Development.
- ENVIS is renamed as EIACP (Environmental Information, Awareness, Capacity Building and Livelihood Programme).
- EIACP serves as a one stop platform for dissemination of environmental information, policy formulation on environment and facilitation of alternate livelihoods through green skilling.
- The programme is one of the Central Sector sub-scheme being implemented in alignment with [Mission LiFE](#).
- EIACP Hub on Status of Environment Related Issues is hosted by the Indian State Level Basic Environmental Information Database (ISBEID).
- The ISBEID is a centralised database maintained by the Ministry of Environment, Forest and Climate Change, Government of India for all the States.
- EIACP conducts Environmental Awareness Programs to School Children, Colleges and Universities on Environmental Important Days like, World Environment Day, World Earth Day, etc.

Biochar

- Biochar is a carbon-rich material that is made from biomass through a thermochemical conversion process known as **pyrolysis**.

- **Pyrolysis** – In this process, organic materials, such as wood chips, leaf litter or dead plants, are burned in a container with very little oxygen.
- As the materials burn, they release little to no contaminating fumes and the organic material is converted into biochar, a stable form of carbon that can't easily escape into the atmosphere.
- The energy or heat created during pyrolysis can be captured and used as a form of clean energy.
- **Physical Attribute** - Biochar is black, highly porous, lightweight, fine-grained and has a large surface area.
- Approximately 70% of its composition is carbon.
- The remaining percentage consists of nitrogen, hydrogen and oxygen among other elements.
- It is produced using a specific process to reduce contamination and safely store carbon.

According to the UN's Intergovernmental Panel on Climate Change (IPCC), biochar could potentially be used to capture 2.6 billion of the 40 billion tonnes of CO₂ currently produced by humanity each year.

Advantages	
<ul style="list-style-type: none">• Enhancing soil structure• Improves soil quality• Produces energy as a by-product• Increasing water retention and aggregation• Decreasing acidity	<ul style="list-style-type: none">• Improving porosity• Regulating nitrogen leaching• Improving electrical conductivity• Improving microbial properties• Reducing nitrous oxide emissions

Role of biochar in climate change

- Biochar production is a **carbon-negative process**, which means that it actually reduces CO₂ in the atmosphere.
- In the process, the unstable carbon is converted into a stable form of carbon that is then stored in the biochar.
- When biochar is applied to the soil, it stores the carbon in a secure place for potentially hundreds or thousands of years.
- By heating the feedstocks and transforming their carbon content into a stable structure that doesn't react to oxygen, biochar technology ultimately reduces CO₂ in the atmosphere.
- Biochar also contributes to the mitigation of climate change by enriching the soils and reducing the need for chemical fertilizers, which in turn lowers greenhouse gas emissions.
- The improved soil fertility also stimulates the growth of plants, which consume CO₂.

One tonne of biochar or bio coal can stock the equivalent of 2.5 to 3 tonnes of CO₂

Vibrio Bacteria in Seaweed

Clusters of brown Sargassum seaweed reported to be infested by Vibrio bacteria, a flesh-eating bacterium, were found awash in Florida.

- **Pathogen storm** - A new study revealed that the *Great Atlantic Sargassum Belt* could become overrun with species of Vibrio bacteria.
- This bacteria can cling to the surface of plastic waste which gets entwined in the large mass of seaweed and poses significant health risks.
- This study says that this could create a perfect pathogen storm.

Great Atlantic Sargassum Belt

- It is a 5,000 mile-wide thicket of seaweed.
- This floating habitat provides food and protection for fishes, mammals, marine birds, crabs, and more.
- When the Sargassum piling up on beaches and decomposes it releases hydrogen sulfide, a toxic gas.

Vibrio Bacteria

- Vibrios are aquatic microorganisms. They are microbiologically characterized as gram-negative, highly motile, facultative anaerobes (not requiring oxygen).
- Some species of which cause serious diseases in humans and other animals.
- People can get infected by Vibrio by eating raw or uncooked seafood.
- Contact with an open wound could cause necrotizing fasciitis, the flesh-eating bacteria infection.
- The infection can lead to amputation or death.
- **Amplification** - Scientists discovered a set of genes called 'zot' genes, which causes leaky gut syndrome.
- If a fish eats a piece of plastic and gets infected by this Vibrio, then it results in a leaky gut and diarrhoea.
- It's going to release waste nutrients such nitrogen and phosphate that could stimulate Sargassum growth and other surrounding organisms.



Fish Kill

Recently thousands of dead fish washed up on multiple beaches of southeast Texas, USA due to 'fish kill'.

- Fish kill is the sudden and unexpected death of many fish or other aquatic animals over a short period and mostly within a particular area.

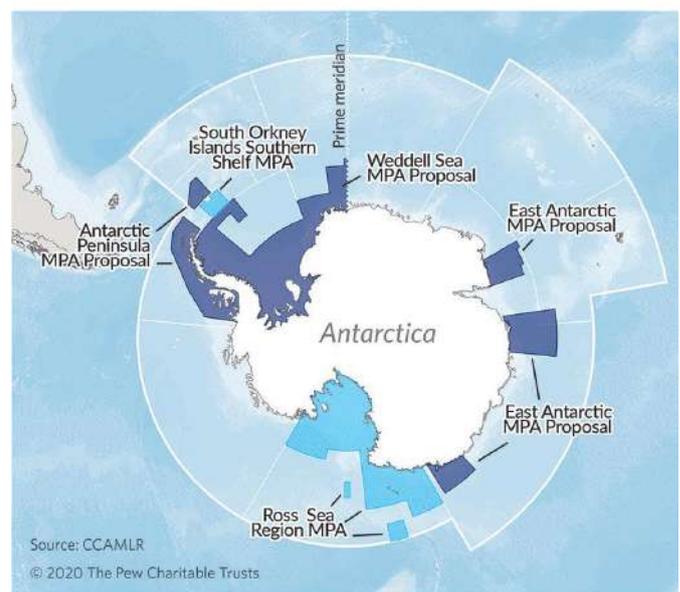
Causes of fish kill

- **Low levels of dissolved oxygen** - When sea surface temperatures rise, it becomes difficult for the fish to breathe as oxygen dissolves easily in colder water compared to warmer water.
- When many fishes get trapped in shallow water, they get warmer more quickly, leading to suffocation.
- This causes fish to act more erratically, which in turn, further depletes the oxygen from the water, ultimately leading to the death of the fish.
- **Calm Seas** - Oxygen enters the sea water by mixing with wind and waves.
- Very calm seas causes the depletion of dissolved oxygen and causes fish kill.
- **Overcast weather** – It refers to more than 95% of cloud coverage.
- Photosynthesis is driven by sunlight and it slows down on cloudy days, resulting in decreased dissolved oxygen concentration.
- **Other reasons** – Alteration in natural water chemistry, biological changes, rising temperatures of oceans, chemical pollution or miscellaneous human activity.

Marine Protected Areas (MPAs) in Antarctic

Members of a multinational group on Antarctic conservation failed to agree on a roadmap for the creation of 3 new marine protected areas.

- **Marine Protected Areas (MPAs)** - It is a section of the ocean where a government has placed limits on human activity.
- Many MPAs allow people to use the area in ways that do not damage the environment.



■ Existing CCAMLR MPA ■ Current MPA proposal or draft scenarios being negotiated by CCAMLR

- Some ban fishing and a few do not allow people to enter the area at all.

MPAs in Southern Ocean

- The Southern Ocean has 2 existing MPAs
 - Southern shelf of the South Orkney Islands
 - Ross Sea Region
- All types of fishing, other than scientific research, are prohibited within the southern shelf of the South Orkney Islands MPA.
- **New 3 MPAs** - Since 2012, the European Union and Australia have proposed an MPA in East Antarctica.
- An MPA was proposed in the Weddell Sea by the EU and Norway and in the waters surrounding the Antarctic Peninsula by Chile and Argentina.
- In 2021, India extended its support for designating East Antarctica and the Weddell Sea as MPA.
- **30X 30 goal** - A global target to protect 30% of the planet for nature by 2030 (known as '30x30').

Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

- It was established by an international convention in 1982 in response to increasing commercial interest in Antarctic krill resources, a keystone component of the Antarctic ecosystem
- **Aim** – To conserve Antarctic marine life.
- **Members** - 27 Members, and a further 10 countries have acceded to the Convention.
- India is a Member of CCAMLR.

SPECIES IN NEWS

Himalayan Brown Bear (*Ursus arctos isabellinus*)

Encroachment pushes Himalayan brown bears into Kashmir’s villages.

- **Description** – The Himalayan brown bear is the largest mammal found in Kashmir.
- It is considerably smaller than the Grizzly and the Kodiak bears.
- **Behaviour** – This is the least arboreal (living in trees) bear and is largely terrestrial as an adaptation to life in the rolling uplands above the tree line.

- It hibernates (Meaning) in winter.

- Hibernation is the condition or period of an animal or plant spending the winter in a dormant state.

- **Distribution** – Through the Western Himalayan states of Jammu & Kashmir Himachal Pradesh and Uttarakhand (3000-5000 m).

Protection Status	
IUCN Status	Critically Endangered
Wildlife Protection Act, 1972	Schedule I
CITES	Appendix I



Himalayan Brown Bear

- It is found from northern Afghanistan, northern Pakistan, northern India, west China and Nepal.
- Populations are present in the Great Himalayan National Park (Himachal Pradesh) and the Deosai National Park, Pakistan.
- They may also be present in south and western Ladakh, in the upper Suru and Zaskar valleys.
- **Habitat** – It is not primarily a forest animal and inhabits alpine scrub and meadows above the tree line although it is occasionally found in subalpine forests.
- **Threats** – They are threatened by habitat destruction due to various anthropogenic pressures such as habitat encroachment, tourism, and grazing pressure.

- The Himalayan brown bear population has been steadily declining in the past century with only an estimated 500-750 bears left in India.

Myristica swamps

Climate change and human intervention threaten the Myristica swamps of Kerala.

- Myristica swamps are freshwater swamps predominated by members of the Myristicaceae family.
- The evergreen trees have evolved to live in the waterlogged conditions of the swamps.
- They have two types of roots, knee roots (pneumatophores) and stilt root.
- They have evolved over millions of years and are comprised of old-growth trees.
- **Location** – In India, these unique habitats occur in the Western Ghats and a smaller distribution exists in the Andaman and Nicobar Islands.
- Myristica swamps are seen next to rivers and help in retaining water and act as a sponge, ensuring perennial water availability.
- **Important Species** – *Gymnocranthera canarica* and *Myristica fatua* – belonging to the primitive Myristicaceae family.



Sea Slaters

A new study has found that diffused light pollution in the night sky could be confusing a species of woodlouse called Sea slaters.

- Sea slaters are members of a group of crustaceans called the *Isopoda* (Iso means “same” and pod means “foot”).
- It is a species of *woodlouse*.
- It is also known as the *common sea slater, or sea roach*.
- **Scientific Name** - *Ligia oceanica*.
- **Habitat** - It is semi-terrestrial and lives in *Europe and Indo-Pacific region*.
- It is found on rocky shorelines, wharf pilings, and harbor areas where it inhabits the borders of the land and sea.
- It is an herbivore and scavenger and eat dead plant and fungal matter thus acting as important “*natural recycler*”.
- While sea slaters are not a threatened or vulnerable species, they play an important part in their local ecosystem.
- They search for food at night and can *change their colour* to blend in and hide themselves from predators.
- Researchers have found that diffused pollution at night can confuse these creatures, rendering their camouflage useless.

Alligator Gar Fish

A non-native alligator gar fish was found in one of Kashmir’s dal lake, raising fears about its impact on the native fish species.

- Alligator gar, the largest of the gar is a fish species with crocodilian head and razor-sharp teeth.
- It is a close relative of the bowfin species.
- **Family** - Belonidae.
- The common name *gar*, or *garfish* or *garpike*, is applied to the needlefish.
- **Habitat** – Central America and North America.
- They are found in freshwaters - Rivers, lakes, and estuaries.
- It is a ray-finned Euryhaline fish and is one of the biggest freshwater fish in North America.
- It is listed as *Least Concern* in the IUCN’s Red data list.

- Being a predator fish and a carnivore, it can eat all types of fishes.
- Gars have the ability to gulp air in response to low-oxygen conditions that often occur in sluggish waters.
- They can even sustain in the cold water temperatures of 11-23 degrees Celsius.
- Alligator gars are oviparous (lay eggs).
- It is considered an *alien fish species (invasive species)* in India as it occurs here outside of its native habitat.
- The alligator gar's fossil records date back to nearly 100 million years ago, hence they are referred as "*living fossil fish*".

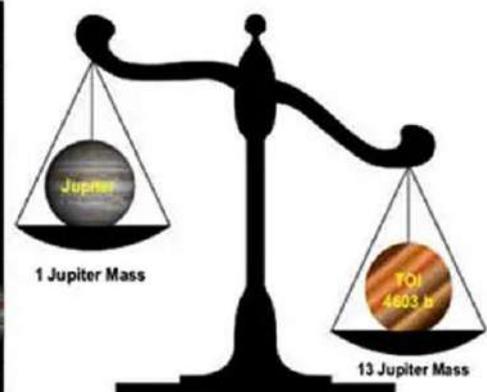
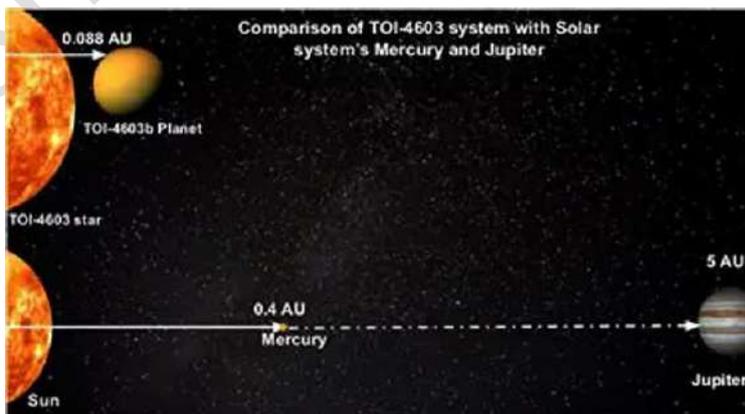
23. SCIENCE AND TECHNOLOGY

SPACE

MBR Explorer

United Arab Emirates is heading for the asteroid belt.

- The spacecraft, named MBR Explorer after Sheikh Mohammed bin Rashid al-Maktoum, the ruler of Dubai and prime minister of the UAE, is scheduled to launch in 2028.
- Building off the success of its [Hope spacecraft](#), which is still circling and studying Mars, the United Arab Emirates announced plans for an ambitious follow-up mission.
- The mission aims to take a grand tour of the asteroid belt.
- In February 2030, the spacecraft will arrive at Wester Wald, a 1.4-mile-wide asteroid, zipping past at 20,000 mph on its way to visit 6 more objects in the asteroid belt between Mars and Jupiter.
- The mission would get a more detailed look at the surface of the asteroid.
- This helps to understand the interior density and the structure of the asteroid.
- **Justitia** – The seventh asteroid, Justitia, is the most intriguing.
- About 30 miles wide, Justitia is very reddish, an unusual colour for an asteroid.
- Indeed, it looks more like one of the small icy worlds found in the Kuiper belt, circling the sun beyond the orbit of Neptune.
- That has led planetary scientists to speculate that Justitia formed in the outer reaches of the solar system and then was scattered inward by the shifting orbits of the giant planets, eventually joining the asteroid belt.
- A visit to Justitia would provide a close-up study of a Kuiper belt object without the long trip to the solar system's distant reaches.
- The MBR Explorer is scheduled to sidle up within a few hundred feet of Justitia in October 2034.
- It will spend at least 7 months studying it with cameras and spectrometers that will be able to identify the asteroid's composition, including the presence of water.
- The reddish colour is believed to point to carbon-based molecules that are the building blocks for life.
- The spacecraft will also drop off a small lander to set down on Justitia's surface.



PRL Advanced Radial-velocity Abu-sky Search spectrograph (PARAS)

Indian scientists discover new exoplanet with mass 13 times that of Jupiter.

- **Exoplanet** – An exoplanet is any planet beyond the solar system.
- Massive giant exoplanets are those having mass greater than four times that of Jupiter.
- A new Jupiter-size exoplanet with the highest density has been discovered by an international team of scientists.
- The newly discovered exoplanet is found around the star called TOI4603 or HD 245134.
- NASA’s The Transiting Exoplanet Survey Satellite (TESS) initially declared TOI4603 as a possible candidate to host a secondary body of unknown nature.
- Using PARAS, scientists discovered it as a planet by measuring the mass of the secondary body and hence, the planet is called TOI 4603b or HD 245134b.
- It is located 731 light years away.
- It orbits a sub-giant F-type star TOI4603 every 7.24 days.
- **PARAS** – PARAS (PRL Advanced Radial-velocity Abu-sky Search) Spectrograph is a ground-based device designed for the purpose of detecting extrasolar planets.
- Located at the Mt. Abu observatory in India, it operates on a 1.2m telescope.
- The spectrograph used in PARAS operates at a resolution of 67000, allowing for precise measurements of radial velocity.

Space Industry Debris Mitigation Recommendations

The World Economic Forum (WEF) and the European Space Agency (ESA) jointly released the Space Industry Debris Mitigation Recommendations to mitigate the space debris problem.

Space Debris

- It is any piece of machinery or debris left by humans in space. It can be dead satellites, bits of debris or paint flecks that have fallen off a rocket.
- **Russia** has the most space debris with over 7000 rocket bodies floating in space.

WEF Guidelines

- The guidelines are not exactly rules, and are, therefore, non-binding.
- **Post-mission disposal (PMD)** - The guidelines say that spacecraft operators try to get satellites removed from low-Earth orbit within 5 years after the end of the mission.
- In case operators are not able to maintain control of the satellite and de-orbit it, they must ensure that it does not turn into space debris.
- **Collision avoidance systems** - Missions that orbit above an altitude of 375 kilometres should have an ability to actively manage the orbit.
- The guidelines encourage a propulsion-based system but other technologies could be more appropriate depending on the situation.
- **Data sharing and traffic management** - Every satellite operator should try to proactively coordinate with other operators and entities to create operational coordination agreements and space situational awareness information-sharing.
- **Financial measures** - Third-party liability insurance organizations should consider incentives for sustainable missions, and appropriate safety measures should be implemented
- **Environmental Capacity** - It encourages industry players to further study the objects in orbit—the population, evolution, and the interaction between them.

The Kessler syndrome is a scenario in which the density of objects in Low Earth Orbit (LEO) is high enough that collisions between objects could cause a cascade that increases the likelihood of further collisions

Countries	Space Debris Mission
Europe	ClearSpace-1
India	NETRA Project
Japan	Elsa-D
EU	RemoveDebris
USA	NASA Orbital Debris Program

- **Long-term goals** - This includes asking governments to require by 2030 that all space missions have capabilities to remove satellites from orbit within 5 years of the end of mission.

Phosphorus on Enceladus

High concentrations of phosphorus have been detected by NASA’s Cassini spacecraft in ice crystals spewed from the interior ocean of Saturn’s moon Enceladus.

- Enceladus is a small moon of Saturn with an ocean of liquid water beneath its icy crust.
- It’s the first time phosphorous has been discovered in an ocean beyond Earth.
- The interior ocean of Enceladus is about 1/7th the size of Earth’s moon and the 6th largest among Saturn’s 146 known natural satellites.
- Titan is the largest moon in Saturn and 2nd largest moon in our solar system.

DID YOU KNOW?
According to NASA, Jupiter has 95 Moons and Saturn has 146 moons, as on May 23, 2023

Cassini Spacecraft

- It is a joint NASA-European space agency mission.
- Cassini-Huygens is an unmanned spacecraft sent to the planet Saturn in 2004.
- It is the 4th space probe to visit Saturn (Pioneer 11, Voyager1, Voyager 2) and the first to enter orbit.
- Its design includes a Saturn Orbiter and a Lander called “Huygens” for the moon Titan.
- This was the first landing ever accomplished in the outer solar system.

Curiosity Rover

NASA’s Curiosity rover sends a beautiful postcard image from Mars.

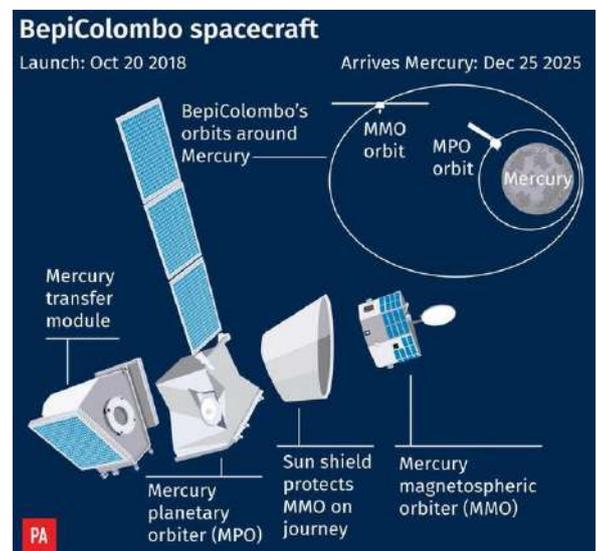
- **Launch Year** – 2012.
- It is a part of Mars Science Laboratory (MSL) mission of NASA.
- It is the largest and most capable rover ever sent to Mars.
- **Aim** - To climb onto the layered deposit in the center of the Gale Crater to assess its possible origins.
- Gale crater, located just south of the Martian equator was formed by the impact of a large meteorite sometime between 3.5 and 3.8 billion years ago.
- **Findings** - Curiosity’s scientific tools found chemical and mineral evidence of past habitable environments on Mars.
- It continues to explore the rock record from a time when Mars could have been home to microbial life.

Mars Missions	Countries
Mangalyaan	India
Perseverance	U.S.
Hope	UAE
Tianwen-1	China
Mars 2 and Mars 3	Russia
Insights	U.S.

BepiColombo Spacecraft

Recently, BepiColombo spacecraft flew close to Mercury to take pictures of the planet.

- **Launched on** – 2018.
- **Launch Vehicle** - Ariane 5.
- **Aim** – It will study and understand the composition, geophysics, atmosphere, magnetosphere and history of Mercury, the least explored planet in the inner Solar System.
- **Agency** – It is a joint mission between the European Space Agency (ESA) and the Japan Aerospace Exploration Agency (JAXA).
- The BepiColombo mission is based on two scientific spacecraft and one transfer module:



- Mercury Planetary Orbiter (MPO)
- Mercury Magnetospheric Orbiter (MMO)
- Mercury Transfer Module (MTM)
- It will chart the planet's mineralogy and elemental composition, determine whether the interior of the planet is molten or not, and investigate the extent and origin of Mercury's magnetic field.
- It made its first flyby of Mercury on 2021 and sent back several images.
- This is the first Mercury missions for the ESA and Japan.

Other Mercury Missions	Countries	Launch
Mariner 10	NASA	1973
MESSENGER	NASA	2004

Lunar Missions

International Lunar Research Station (ILRS)

- ILRS is a set of complex research facilities to be constructed with the possible involvement of international partners on the surface and/or in the orbit of the Moon.
- It is designed for multi-purpose scientific research activities with the capability of long-term unmanned operation with the prospect of subsequent human presence.
- It is a joint venture between China and Russia.
- The basic version of the ILRS to be completed before 2028. After 2030, missions' code named ILRS-1/2/3 will be launched toward building of an improved version of the ILRS.

Mission	Country	Objective	Status
Chang'e 5	China 	Soft-landed on the south pole of the moon and collected samples	Launched on November 2020
Danuri mission	South Korea 	Orbiter will study moon from January 2023 after entering lunar orbit	Launched on Aug, 2022
Artemis - I	USA 	First uncrewed integrated flight mission to moon	Launched on November 2022
ispace's Hakuto-R Mission	Japan 	UAE rover and Japanese payload on a lander; crash-landed	Launched on Dec, 2022
Chandrayaan-3	India 	Lunar exploration with a landing module and rover	Yet to launch on June 2023

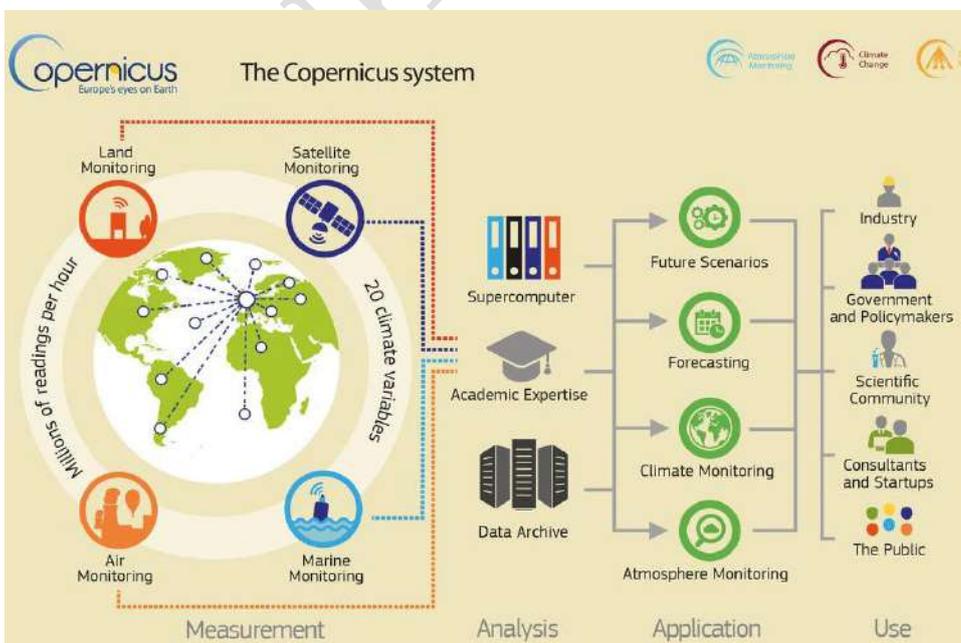
Luna 25	Russia 	Sample gathering from southern pole	Yet to launch on July 2023
Artemis II	U.S.A 	Crewed mission to the moon	Yet to launch on 2024
Unnamed Mission	China 	Crewed mission to the moon	Yet to launch on 2030

The Copernicus System

June 8, 2023 marks the 25th anniversary of Copernicus, the earth observation component of the European Union's space programme.

- **Launch year**- 1998
- **Previous name** - Global Monitoring for Environment and Security Programme (GMES)
- **Aim** - To provide information on the earth's environment to aid sectors like agriculture, climate change, disaster management, urban planning, and more.
- **Working** - Copernicus integrates satellite and non-space data, including ground-based, airborne, and seaborne measurement systems, to offer data related to earth observation.
- The mission relies on a group of satellites, called **Sentinel satellites**, for gathering data.
- **Implementing agency** - Copernicus was implemented by member states in association with
 1. The European Space Agency (ESA),
 2. The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT),
 3. The European Centre for Medium-Range Weather Forecasts (ECMWF),
 4. EU Agencies and Mercator Ocean.
- It is managed by the European Commission.
- **Access** - Its data is freely available for anyone to access.

DID YOU KNOW?
The programme is named after Nicolaus Copernicus, the 15th-century Polish scientist who first proposed a heliocentric universe model



Sentinel Satellites

The European Space Agency (ESA) is developing a new family of missions called Sentinels specifically for the operational needs of the Copernicus programme.

These missions carry a range of technologies, such as radar and multi-spectral imaging instruments for land, ocean and atmospheric monitoring.

DEFENCE

Varunastra

Indigenously made Varunastra was successfully test-fired with a live warhead against an undersea target, by the Indian Navy.

- Varunastra is a ship launched, heavy weight, electrically-propelled anti-submarine torpedo.
- It is capable of targeting quiet submarines, both in deep and shallow waters in an intense countermeasure environment.
- **Agencies** - It was designed and developed by Vizag-based Naval Science and Technological Laboratory (NSTL) under the Defence Research and Development Organisation (DRDO).
- **Manufacturer** - It is manufactured by Bharat Dynamics Ltd (BDL).
- **Induction** - Inducted by Indian Navy in 2016.
- It can be fired from all Anti-submarine warfare (ASW) ships capable of firing heavy weight torpedoes.
- **Warhead & Range** - It can carry a warhead weighing 250 kg and has an operational range of 40 km.
- **India** is in a group of 8 countries that have the capability to manufacture heavyweight torpedoes.
- **Torpedo** – It is cigar-shaped, self-propelled underwater missile, launched from a submarine, surface vessel, or airplane and designed for exploding upon contact with the bodies of surface vessels and submarines.
- The anti-submarine electric torpedo is 7 to 8 metres long with a diameter of 533 mm.

Fattah or Conqueror

Iran unveils a hypersonic missile, able to beat air defences amid tensions with U.S.

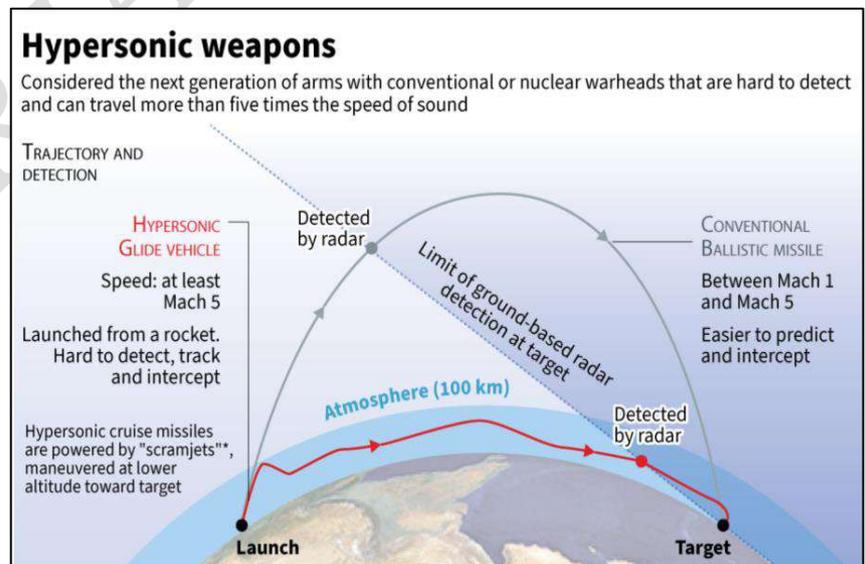
- It is the first-ever domestically-made hypersonic ballistic missile created by Islamic Revolutionary Guard Corps (IRGC), Iran.
- **Islamic Revolutionary Guard Corps (IRGC)** - It is a multi-service (ground, naval, and air forces) primary branch of the Iranian Armed Forces.
- **Speed** – Mach 15
- **Range** – Upto 1400 kms
- It is named by the Iranian Supreme Leader Ayatollah Ali Khamenei 'Fattah' in Farsi, which means conqueror.
- It can bypass the most advanced anti-ballistic missile systems.

Hypersonic Missiles

- Hypersonic missiles are manoeuvrable, unlike the ballistic missiles that follows a set course or a ballistic trajectory.
- It moves at 5 times the speed of sound or greater and are manoeuvrable, making them difficult for defence systems and radars to target.
- Like traditional ballistic missiles, they can deliver nuclear weapons.

Agni Prime or Agni - P

New Generation Ballistic Missile 'Agni Prime' was successfully flight-tested by Defence Research and Development Organisation (DRDO).



- It is a **nuclear-capable** new-gen advanced variant of the Agni class of missiles.
- **Aim** – To counter Pakistan’s forces owing to the fact that its range is insufficient to reach all parts of mainland China.
- **Objective** - To achieve maximum manoeuvrability against missile defense system and higher accuracy for precision strike.
- **Agency** – Developed by DRDO.
- **Programme** - It is developed under Integrated Guided Missile Development Program (IGMDP).
- **Range** - It is a medium – range ballistic missile with a range of 1,000 to 2,000-km.
- It is a 2-stage canisterised missile that can be launched from rail or road, be stored for longer periods and can be transported as per operational requirements.
- Canisterisation of missiles reduces the time required to launch the missile while improving its storage and mobility.
- **Weight** - It is lighter than all the earlier Agni series of missiles.

Integrated Guided Missile Development Programme (IGMDP)	
<ul style="list-style-type: none"> • It is a Ministry of Defence programme to research and develop missiles. • The project was started in 1982–1983 under the leadership of Dr APJ Abdul Kalam. • It accomplished its design objectives by 2012. • The Defence Research and Development Organisation (DRDO) and erstwhile Ordnance Factories Board (OFB) managed the programme with other Indian government political organizations. 	<p>Missiles developed under IGMDP</p> <ol style="list-style-type: none"> 1. PRITHVI 2. AGNI 3. TRISHUL 4. AKASH 5. NAG

Fuel cell AIP Vs Stirling AIP

The German shipbuilders signed an agreement India’s Mazagon Dock Limited (MDL) to cooperate in building 6 state-of-the-art submarines for the Indian Navy.

- The submarines, powered by air-independent propulsion (AIP), are planned to be built under Rs 45,000 crore programme called Project 75-I under the “strategic partner” (SP) acquisition category.
- **Conventional diesel-electric submarines** – It can operate underwater silently for up to 48 hours.
- **AIP-driven submarines** – It remain underwater for up to 2 weeks before they must surface for battery charging.

Fuel cell AIP

- Fuel cell-based AIP generates power through the reverse electrolysis of oxygen and hydrogen.
- This process does not need air, but requires storage of highly inflammable hydrogen on board.
- Fuel cell AIP systems are associated with German submarines of Class 212A and Class 214, and will power the Project 75-I submarines too.
- Other fuel cell AIPs are being developed in other countries, such as Russia (alkaline fuel cells) and India (phosphoric-acid fuel cells).
- **Class 212A submarines** are 3 times larger than previous German Navy Class 206 submarines.
- In addition, fuel cell-based AIP systems require meticulous crew training and dedicated infrastructure.
- A key problem in fuel cell development was to master hydrogen storage.

Stirling AIP

- The 2nd type of AIP, based on the Stirling engine, is the first modern combat-ready system.
- It is a simple system that uses diesel fuel (typical for the submarine) and liquid oxygen, discharging the plant overboard at small and medium depths.

- Low-power Stirling engines are *much quieter* than main diesel generators of submarines, providing considerable tactical gains.
- It took less than 15 years for the creation of this system from concept to implementation.
- Although this system *lacks stealth*, it has proved relatively good in a small area, shallow depths, complex hydrology and heavy traffic, which require a submarine's acoustic signature to be minimised.
- The Stirling engine is compact enough for small submarines.

Predator Unmanned Aerial Vehicles (UAV)

Defence Acquisition Council (DAC) approved the procurement of armed Predator Unmanned Aerial Vehicles (UAV) from General Atomics Aeronautical Systems (GA-ASI), United States.

- **Unmanned Aerial Vehicle (UAV)** - It is an aircraft that carries no human pilot or passengers.
- UAVs are sometimes called as drones that can be fully or partially autonomous but are more often controlled remotely by a human pilot.
- **Predator Unmanned Aerial Vehicles (UAV)** - The Predator drone or the MQ-9 Reaper is a long-endurance, medium-altitude, turboprop-powered, multi-mission, unmanned aircraft system (UAS).
- **Developed by** - General Atomics Aeronautical Systems, U.S.
- **Endurance** - >27 hours.
- **Speed** - 240 KTAS. (KTAS - True Airspeed of an Airplane charter measured in Knots).
- **Height** - up to 50,000 feet.
- **Payload Capacity** - 1,746 kilograms.
- **Advantages** - It provides a long-endurance, persistent surveillance/strike capability for the war fighter.
- It is equipped with a fault-tolerant flight control system and triple redundant avionics system architecture.
- It is engineered to meet and exceed manned aircraft reliability standards.

DID YOU KNOW?

The maritime variant of the MQ-9 UAV, known as Sea Guardian, has an endurance of over 30 hours

Submersible vs Submarine

The Titan, one of the crewed submersibles operated by OceanGate, went missing in the area of the Titanic wreck in the North Atlantic.

Titan

- Titan is the only crewed submersible in the world that can take 5 people as deep as 4,000 meters enabling it to reach almost 50% of the world's oceans.
- It is made of carbon fiber and titanium.
- The submersible was part of an 8-day journey conducted by OceanGate Expeditions to reach the Titanic wreck site.
- The wreck site is about 900 miles off the coast of Cape Cod, Massachusetts.
- Once submerged, the platform uses a *patented motion-dampening flotation system* to remain coupled to the surface that provide a stable underwater platform.
- At the conclusion of each dive, the sub lands on the submerged platform and the entire system is brought to the surface in approximately 2 minutes by filling the ballast tanks with air.

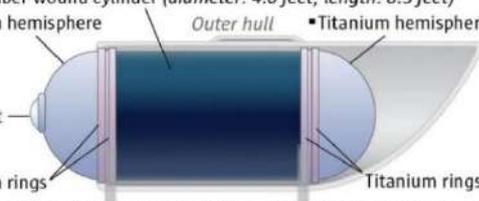
Titan: Manned submersible

Designed and built by OceanGate, Titan is a Cyclops-class manned submersible able to dive to depths of 13,123 feet with a crew of five and can carry up to five people. It is designed to be used for site survey and inspection, research and data collection, film and media production, and deep sea testing of hardware and software.

- Capacity: **Five** (one pilot, four crew)
- Life support: **96 hours for five passengers**
- Maximum depth: **13,123 feet**

PRESSURE VESSEL MATERIAL

- Carbon-fiber-wound cylinder (diameter: 4.6 feet, length: 8.3 feet)
- Titanium hemisphere
- Titanium rings



- Viewport
- Propulsion: Four electric thrusters (two vertical, two horizontal)

Submersible

- A submersible is a small boat or other craft, designed especially for research and exploration.
- It does not function as an autonomous craft and *needs a mother ship* that can launch and recover it.
- The submersibles have a top speed of 3 knots (5.5 kmph).

- It can't stay underwater for as long compared to submarines.
- Since there is no GPS underwater, the submersible is only *guided by text messages* from the surface ship.
- The pilot steers the sub using a video game controller but if that fails, a hard-wired system can control the propellers.

Submarines

- A submarine is a watercraft capable of *independent operation underwater*.
- It refers to any naval vessel that is capable of propelling itself beneath the water as well as on the water's surface.
- When submarine is to dive, water is filled in water tanks and it is made heavier.
- Since the average density of submarine becomes greater than the density of sea water, it sinks.
- To make the submarine rise to the surface of water, water tanks are emptied.

HEALTH

Global Vaccine Research Collaborative

India urges G-20 countries to join the proposed vaccine research collaborative on the sidelines of the 3rd meeting of the [G-20 Health Working Group](#).

- **Aim** - It aims to leverage expertise and resources from various stakeholders to expedite vaccine development and mitigate the impact of future pandemics.
- The Department of Pharmaceuticals is working with a non-profit Program for Appropriate Technology in Health (PATH) and the Coalition for Epidemic Preparedness Innovations (CEPI) to build this collaborative.
- This initiative will focus on addressing major gaps in vaccine R&D before the next pandemic, establishing a structure and principles for better preparedness.
- It will create a mechanism to improve coordination and foster an enabling environment for vaccine R&D.

Cholederm

Indian Drugs Controller approves first indigenously developed animal-derived tissue, named cholederm

- Cholederm is a wound healing material derived from the extracellular matrix of de-cellularised gall bladder of pig.
- It is a Class D Biomedical Device material.
- **Indigenous one** - It is the first indigenously developed product to all statutory requirements of the Central Drugs Standard Control Organisation.
- **Developer** - Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), an autonomous institution of the Department of Science and Technology (DST).
- **Advantages** - The treatment cost can be reduced making it more affordable to the common man.
- Cholederm healed different types of skin wounds including burn and diabetic wounds faster than other products with minimal scarring.
- Moreover, the technology for recovering extracellular matrix from the gallbladder is not available to others and it gives a fair chance for competition in the international market.

Central Drugs Standard Control Organisation (CDSCO)

- The CDSCO is the national regulatory body for pharmaceuticals and medical devices in India.
- **Regulatory authority** - Ministry of Health & Family Welfare
- **Headquarters** - New Delhi
- Under the *Drugs and Cosmetics Act*, CDSCO is responsible for approval of drugs, conduct of clinical trials, laying down the standards for drugs, control over the quality of imported drugs in the country.

- CDSCO along with state regulators, is jointly responsible for grant of licenses of certain specialized categories of critical drugs such as blood and blood products, I. V. fluids, vaccine and sera.
- The ***Drug Controller General of India (DCGI)***, which is an organ of the CDSCO, is responsible for approving and licensing of drugs and medical devices.

Prevalence of Anaemia in India

The 6th round National Family Health Survey (NFHS), is scheduled to begin on July 1.

Anaemia

- Anaemia is linked to insufficient *healthy red cells* (haemoglobin) that carry oxygen in the body.
- **Reasons** - Iron deficiency, deficiencies in folate, Vitamin B12, Vitamin A, chronic conditions such as diabetes or inherited genetic disorders.
- There are 5 documented types of anaemia:
 - Aplastic anaemia,
 - Iron deficiency anaemia,
 - Sickle cell anaemia,
 - Thalassemia,
 - Vitamin deficiency anaemia.

WHO standard on Haemoglobin diagnostic cut-off for

- Men - 14 gm/deciliter,
- Women 12 gm/decilitre
- Boys and girls - 11-12 gm/deciliter.

Anaemia in India

- An estimate shows 1.3% of the GDP for children and 4% of the GDP for children and adults combined are lost due to anaemia-related illnesses in India.
- NFHS-5 showed at least 67% of children having anaemia as compared to 58.6% in the last survey conducted in 2015-16.
- World Bank data shows one in two Indian women is anaemic, 20% higher than the world average.
- India has recognised anaemia as a *public health challenge*.
- Schemes related to Anaemia
 - [Anaemia Mukh Bharat \(AMB\) strategy](#),
 - [Integrated Child Development Services \(ICDS\)](#),
 - National Nutritional Anaemia Prophylaxis Programme (NNAPP) and Pradhan Mantri Surakshit Matritva Abhiyan

GEMCOVAC-OM

India's first indigenous mRNA vaccine (GEMCOVAC-OM) for the Omicron variant, was approved under emergency use guidelines by the Drug Controller General of India.

- **Developed by** - Pune-based Gennova Biopharmaceuticals Ltd.
- **Features** – It is India's first mRNA vaccine developed to address the problems in the earlier approved mRNA vaccines.
- This mRNA-based vaccine uses spike protein of the omicron variant (BA.1) of the SARS- CoV-2 as an antigen.
- It was stable in a 2-8 °C range and could therefore be stored in ordinary refrigerators.
- The vaccines could be administered as an intradermal (ID) injection only (into the skin) via a "*needle-free*" *PharmaJet system*.
- It is tested at the National Institute of Virology (NIV) against the newest (Omicron subvariant), XBB 1.16, and it is shown to be effective.
- It is indicated as a single booster dose in individuals aged more than 18 years administered at least 4 months after completion of primary vaccination with either Covishield or Covaxin.

m-RNA based vaccine technology

- mRNA vaccines work by introducing a piece of mRNA that instructs the cells to produce the viral protein.
- As part of a normal immune response, the immune system recognizes that the protein is foreign and produces specialized proteins called antibodies.
- Antibodies protect the body against infection by recognizing individual viruses or other pathogens, attaching to them, and marking the pathogens for destruction.
- Once produced, antibodies remain in the body, even after the body has rid itself of the pathogen.
- If a person is exposed to a virus after receiving mRNA vaccination for it, antibodies can quickly recognize it, attach to it, and mark it for destruction before it can cause serious illness.
- Individuals who get an mRNA vaccine are not exposed to the virus, nor can they become infected with the virus by the vaccine.

mRNA is a molecule that contains the instructions or recipe that directs the cells to make a protein using its natural machinery.

mRNA based vaccines	Developed by	Doses	Storage
GEMCOVAC™-19	India	Booster	2-8 °C
Pfizer-BioNTech	USA-Germany	2	-80 to -60°C (6 months) & 2 to 8°C (for up to 5 days)
Moderna COVID-19	USA	2	-25 to -15°C (6 months) and 2 to 8°C (for up to 30 days)

Skin bank

North India's first skin bank opens in Safdarjung Hospital, Delhi.

- Skin Bank** – It is a valuable resource in providing cadaveric allograft skin (human cadaver skin donated for medical use) as a cover for partial-thickness and full-thickness burn injuries.
- The skin from a donor is generally harvested within 6 – 8 hours of death.
- Only 1/8th thickness part of the skin is taken and stored in glycerol, and then taken to a skin bank.
- Donated skin** – It includes the skin obtained from
 - Any unburned spot of the same patient – Autograft
 - Cadaveric Skin – Allograft
 - Animals – Xenograft
- A person can donate their organs only in the case of brain death, but they can donate their eyes and skin even when they suffer a cardiac death.
- The bank is a boon for patients as there is no blood group matching required in skin grafting.
- Preservation Methods** - Cryopreservation is the preferred method for long term storage of viable skin grafts.
- Donor skin can be frozen and stored for 4-8 degree Celsius up to 5 years.
- Criteria for donating Skin**
 - A skin donor should be 18 Years or above.
 - Only those suffering from HIV & Hepatitis B & Hepatitis C, generalized infection & Septicemia (Pneumonia, T.B, etc.), any kind of skin infection, malignancy and having evidence of skin cancer, cannot donate.

DID YOU KNOW? 

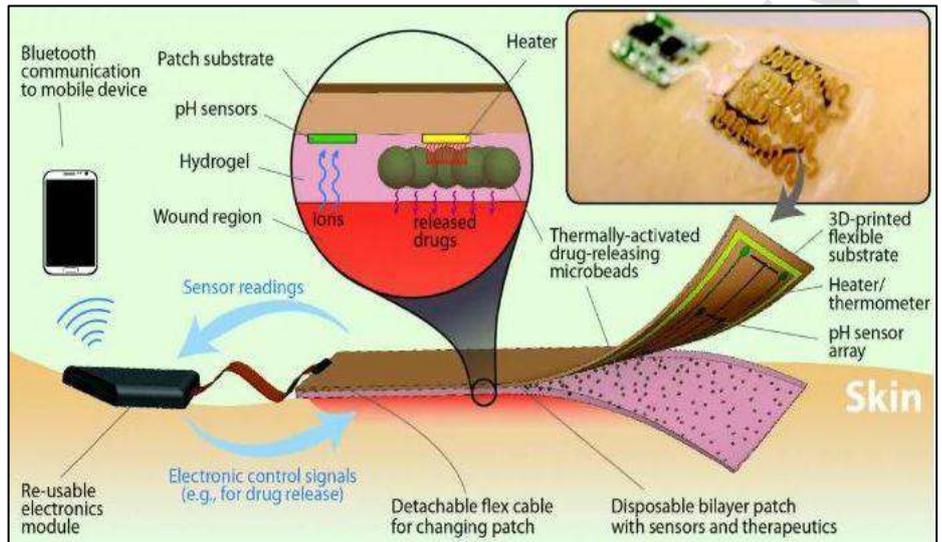
The first skin bank was established in the USA around 1950.
India has 16 skin banks across the country.

BIO-TECHNOLOGY

Smart Bandage

A new 'smart bandage' raises the bar for treating chronic wounds.

- The smart bandage is a soft stretchable polymer that helps the bandage maintain contact with and stick to the skin.
- The bioelectronics system consists of biosensors that monitor biomarkers in the wound exudate.
- Data collected by the bandage is passed to a flexible printed circuit board, which relays it wirelessly to a smartphone or tablet for review by a physician.
- A pair of electrodes control drug release from a hydrogel layer as well as stimulate the wound to encourage tissue regrowth.
- **Working of smart bandages** - Biosensors determine the wound status by tracking the chemical composition of the exudates, which changes as the wound heals.
- Additional sensors monitor the pH and temperature for real-time information about the infection and inflammation.
- A pair of electrodes, the same electrodes that stimulate the tissue, control the release of drugs from a hydrogel layer.
- The wireless nature of the device sidesteps the problems of existing electrical stimulation devices, which usually require bulky equipment and wired connections, limiting their clinical use.



Disposal of Medical Waste using Clay

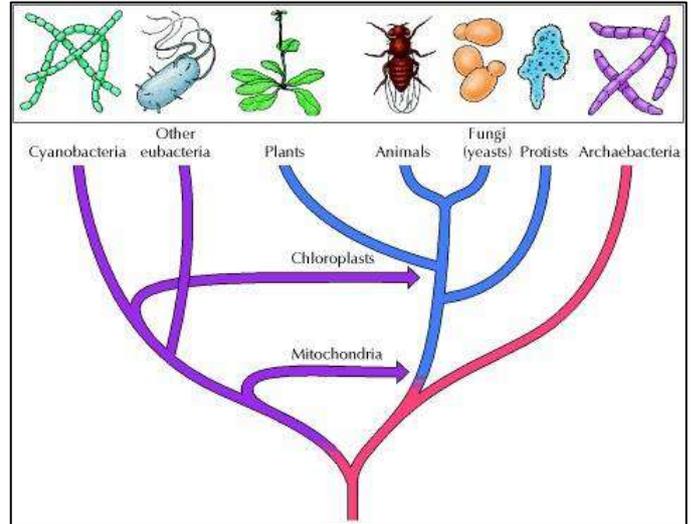
Indian Institute of Technology-Guwahati (IIT-G) scientists proposes the use of compost natural clay to neutralise pathogens in waste.

- **Bio-medical waste** –It means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities.
- **Top Producer - Canada** is the topmost producer of biomedical waste.
- Biomedical Waste Management Rules 2016, was notified by the Ministry of Environment, Forest and Climate Change.
- It categorises the bio-medical waste generated from the health care facility into 4 categories based on the segregation pathway and colour code.
- Various types of bio medical waste are further assigned to each one of the categories, as Yellow Category, Red Category, White Category, Blue Category.
- **Issues** - The waste from hospitals and residences of COVID-19 patients was treated in the same way as municipal solid waste (MSW) during the pandemic.
- This could lead to the escape of infectious viral pathogen waste, potentially causing secondary infections in humans.
- **Clay - Bentonite and kaolin** clays in powder form can prevent the viral contamination from entering into the environment.
- **Newcastle disease virus (NDV)** - It was earlier observed that the removal efficiency of the NDV depended on the quality of bentonite and multilayer sorption of the virus on clay surfaces.
- NDV is an infectious and contagious viral infection that affects more than 250 different bird species worldwide.

Evolution of Eukaryotes

Mitochondria in eukaryotic cells and chloroplasts in plant cells have evolved from free-living bacteria.

- Present-day cells evolved from a common prokaryotic ancestor along 3 lines of descent, giving rise to *archaeobacteria*, *eubacteria*, and *eukaryotes*.
- The first eukaryotic cells evolved about 2 billion years ago, this is explained by the endosymbiotic theory.
- Endosymbiosis came about when large cells engulfed small cells where the small cells were not digested by the large cells instead, they lived within the large cells and evolved into organelles.
- From independent cell to organelle the large and small cells formed a symbiotic relationship in which both cells benefited.
- **Mitochondria** - Some of the small cells were able to break down the large cell's wastes for energy.
- They supplied energy not only to themselves but also to the large cell.
- They became the mitochondria of eukaryotic cells.
- **Chloroplasts** - Other small cells were able to use sunlight to make food.
- They shared the food with the large cell.
- They became the chloroplasts of eukaryotic cells.
- The ancestor of mitochondria was a proteobacterium that was engulfed by an asgard archaean organism.
- Descendants of this endosymbiotic union gave rise to animals, fungi and plants.
- In plants, the asgard-mitochondrial union was followed by the intake of a photosynthesizing cyanobacterium, which became the chloroplasts.

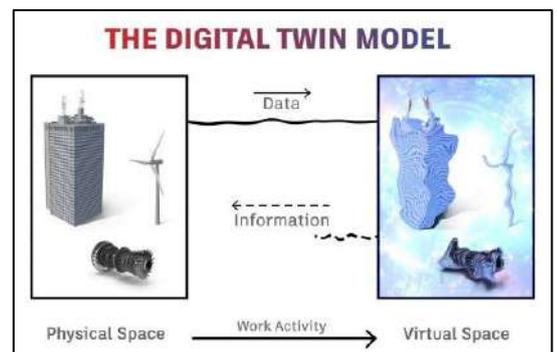


INFORMATION TECHNOLOGY

Digital Twins

A recent data shows that Digital twins will reshape business and society by 2035.

- **Digital twin** - It is a digital representation of a physical object, process, service or environment that behaves and looks like its counterpart in the real-world.
- It spans the object's lifecycle and uses real-time data sent from sensors on the object to simulate the behavior and monitor operations.
- Digital twins can replicate many real-world items, from single pieces of equipment in a factory to full installations, such as wind turbines and even entire cities.
- **Types** - Component twins/Parts twins, Asset twins, System or Unit twins, Process twins.



Digital Twin	Simulation
<ul style="list-style-type: none"> • Utilize digital models to replicate a system's processes • Studies multiple processes • Digital twins are designed around a 2-way flow of information. • A digital twin is built out of input from IoT sensors on real equipment, which means it replicates a 	<ul style="list-style-type: none"> • Utilize digital models to replicate a system's processes • Studies one particular process • Simulations usually don't benefit from having real-time data • A simulation is designed with a CAD system or similar platform, and can be put through its

<p>real-world system and changes with that system over time.</p> <ul style="list-style-type: none">• A digital twin provides all parts of the business insight into how some product or system they're already using is working now.	<p>simulated paces, but may not have a one-to-one analog with a real physical object.</p> <ul style="list-style-type: none">• Simulations tend to be used during the design phase of a product's lifecycle, trying to forecast how a future product will work.
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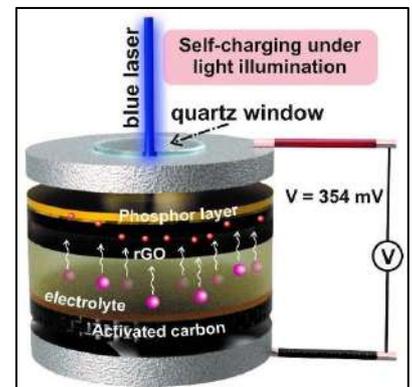
OTHERS

Light-powered Supercapacitors

A group of researchers from India and South Korea have developed a portable supercapacitor that can be charged using light.

Supercapacitor

- Supercapacitors are a type of an electrochemical energy storage systems which have great power density and specific capacitance.
- Supercapacitor differs from ultracapacitor as they are built from different materials and structured in slightly different ways, so they store different amounts of energy.
- A supercapacitor device consists of an electrode, electrolyte and a current collector.
- A capacitor stores energy by means of a static charge as opposed to an electrochemical reaction.
- Applying a voltage differential on the positive and negative plates charges the capacitor.
- They present lower energy densities (they store less energy per unit mass) than batteries.
- **Applications** - Portable and wearable devices such as smartphones, tablets, laptops and smartwatches.
- **Advantages of Supercapacitors**
 - Quick charging and discharging
 - Exhibit long life since they are not subject to chemical degradation as in conventional batteries
 - Greater power density (can release energy more quickly)
 - Smaller in size
 - Provides back-up power during power outages in space applications
 - Have little or no internal resistance (they store and release energy without using much energy)
 - Work at very close to 100% efficiency (97–98% is typical)



Light-powered Supercapacitors

- The researchers developed a design involving a stainless steel electrode with a quartz transparent window in order to harvest visible light.
- A specially prepared 'down-conversion' phosphor is introduced before the quartz window to facilitate light-induced charging.
- Devices that are powered by such supercapacitors can be charged by simply keeping them under light.

Chiral Bose-liquid State

A recent research shows that the chiral Bose-liquid state may be an entirely new state of matter.

- **States of matter** - There are 3 classical states of matter in day to day life- solid, liquid and gas.
- But, exotic or quantum states of matter, such as plasma, time crystals, and Bose-Einstein condensate also exist at the atomic scale, and at extremely low temperatures approaching absolute zero.
- **Chiral Bose-liquid state** - The chiral Bose-liquid state is a new phase discovered by physicists in a frustrated quantum system, where infinite possibilities result from the interaction of particles.
- The team developed a bilayer semiconductor device or a frustration.

- The top layer of the device was made to be electron-rich, in which the electrons can freely move about.
- The bottom layer only had holes, which are slots an electron can occupy.
- Then the two layers are brought extremely close together.
- The machine is then triggered to create a local imbalance resulting in electrons not having enough holes to fill (similar to the game of musical chairs).
- This kicks off the novel state called the chiral Bose-liquid state.
- **Significance** - In this state,
 - Electrons can be frozen into predictable patterns.
 - Electrons can be made resilient to changes in spin (a defining characteristic of subatomic particles)
 - Electrons can even synchronise their movements.

Carbon-dioxide Auroras

NASA's satellite spots infrared carbon dioxide aurora from outer space

Aurora

- An aurora is a natural light display that shimmers in the sky.
- When solar storm interacts with the magnetic field lines at the north and south poles into Earth's atmosphere, it results in beautiful displays of light called auroras.
- Auroras are only visible at night, and usually only appear in lower polar regions.
- Oxygen gives off green and red light and Nitrogen glows blue and purple.
- Auroras are visible near the Arctic and Antarctic Circles, which are about 66.5 degrees north and south of the Equator.
- In the north, the display is called aurora borealis, or northern lights.
- In the south, it is called aurora australis, or southern lights.

Carbon-dioxide Auroras

- A NASA satellite has spotted an aurora that is invisible in optical frequencies.
- While carbon dioxide is known for its effects on the troposphere as a greenhouse gas, it also exists in trace amounts in Earth's atmosphere at the edge of space.
- High above Earth, near 90 km, CO₂ becomes vibrationally excited during an aurora, emitting more infrared radiation than typically observed in the atmosphere.

Aspartame

The International Agency for Research on Cancer (IARC) of the World Health Organisation (WHO) will list aspartame as "possibly carcinogenic" to humans, the third category among the four levels of carcinogens.

- Aspartame is an odourless powder that is white and one of the world's most common artificial sweeteners.
- Chemically, aspartame has 2 amino acids - L-aspartic acid and L-phenylalanine.
- Aspartic acid is produced naturally by your body, and phenylalanine is an essential amino acid that is intaken from food.
- It was discovered by James M Schlatter in 1965.
- It is used as a sugar alternative as it has zero calories (diet soft drinks) and no bitter aftertaste (sugar-free products).
- Aspartame is less sweet than other artificial sweeteners like advantame and neotame, but it is about 200 times sweeter than table sugar.
- 8 g of sugar provides about 32 kcals of energy and 1 g of aspartame is only 4 kcals.
- As per US Food and Drug Administration (FDA), the acceptable daily intake (ADI) for aspartame is at 50 milligrams per kilogram of body weight per day.

DID YOU KNOW?



Phenylketonuria (PKU) is a rare inherited disorder in which the patient does not have the enzyme needed to break down phenylalanine.

- Foods containing aspartame carry the warning “Not for phenylketonurics”.
- Around 100 countries around the world, including *India*, permit the use of aspartame.
- In India, *FSSAI* recommends the maximum permitted levels of aspartame.
- **Other products under WHO’s cancer-causing categories** - Prior to this, working overnight, consuming red meat, and using mobile phones were put under cancer-causing categories.

24. INDEX AND REPORT

Global Slavery Index 2023

G20 countries including India are fuelling modern slavery, says new report.

- It is published by the Australia-based human Rights Group Walk Free Foundation.
- It includes data on three key variables -
 1. Prevalence of modern slavery in each country
 2. Vulnerability
 3. Government responses to modern slavery
- Modern slavery refers to situations of exploitation that a person cannot leave because of threats, violence, coercion and abuse of power or deception.
- The index uses data released by the International Labour Organisation (ILO), Walk Free, and the International Organisation for Migration (IOM).
- **Findings** - The Global Slavery Index 2023 shows the world’s 20 richest countries account for more than half the estimated 50 million people living in modern slavery.
- Among the G20 nations, India tops the list with 11 million people working as forced labourers, followed by China, Russia, Indonesia, Turkey and the U.S.



Joint Child Malnutrition Estimates (JME) 2023

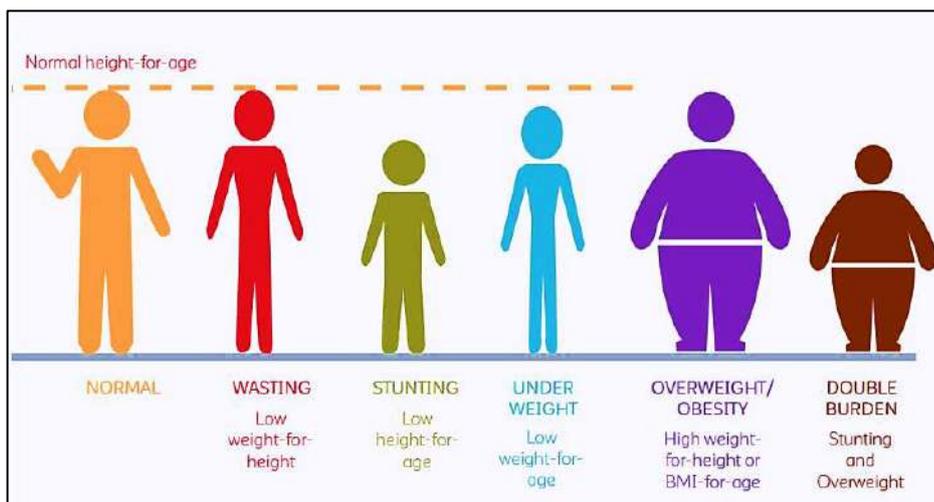
India is having a reduction in stunting but wasting and obesity remains a concern.

- JME 2023 is jointly released by **UNICEF, WHO and World Bank.**

Global Scenario

- **Obesity** - The prevalence of obesity marginally increased in a decade in 2022 compared to 2012.

- But the overall classification for obesity is low and much lower than the global prevalence.
- **Stunting** - It is declined from a prevalence rate of 26.3% in 2012 to 22.3% in 2022.
- In South Asia, the decline was much sharper as it dropped from 40.3% to 30.5%.
- **Wasting** - It is more complex in South Asia and India.



In India

- **Obesity** - Prevalence of overweight children increased in India in 2022 compared to 2012.
- **Stunting** - India continues to show a reduction in stunted children under 5 years in 2022 compared to 2012.
- **Wasting** - In India 2/3rds of children at 12 or 24 months had wasting at birth or at one month of age.
- It is caused by maternal malnutrition.

India's Target

Table 2. The global nutrition targets endorsed by the World Health Assembly and their extension to 2030* for child malnutrition indicators

Indicator	2025 target	2030 target
 Stunting	Reduce the number of children under 5 who are stunted by 40%	Reduce the number of children under 5 who are stunted by 50%
 Wasting	Reduce and maintain childhood wasting to less than 5%	Reduce and maintain childhood wasting to less than 3%
 Overweight	No increase in childhood overweight prevalence	Reduce and maintain childhood overweight to less than 3%

NOTE: *Targets were set considering the baseline year 2012.

The Energy Progress Report 2023

The World is still off-track from achieving universal energy access (SDG 7) to all, says UN report.

- Since 2018, the report envisages to track the Sustainable Development Goal-7 (SDG7).
- **Aim** - It aims to ensure access to affordable, reliable, sustainable, and modern energy for all.
- It is produced annually by 5 of the custodian agencies responsible for tracking global progress toward Sustainable Development Goal 7 (SDG7).
- **Custodian Agencies**
 - The International Energy Agency (IEA),
 - The International Renewable Energy Agency (IRENA),
 - The United Nations Statistics Division (UNSD),
 - The World Bank, and
 - The World Health Organization (WHO)

Highlights of the report

- Despite some progress across the indicators, the current pace is not adequate to achieve any of the 2030 targets.

- Among the major economic factors delaying the realization of SDG7 globally are
 - The uncertain macroeconomic outlook,
 - High levels of inflation,
 - Currency fluctuations,
 - Debt distress in a growing number of countries,
 - Lack of financing,
 - Supply chain bottlenecks,
 - Tighter fiscal circumstances, and
 - Soaring prices for materials.
- The effects of the Covid-19 pandemic and the steady rise in energy prices since summer 2021 are expected to be a further drag on progress, particularly in the most vulnerable countries.
- This particularly concerns lacking universal access to electricity and clean cooking in developing economies, with projections indicating that SDG 7 will not be reached by 2030.
- The uptake of renewable energy has grown since 2010, but efforts must be scaled up substantially, the UN bodies found.
- The rate of improvement in energy efficiency is not on track to double by 2030, with the current trend of 1.8% falling short of the targeted increase of 2.6 % each year between 2010 and 2030.
- To support clean energy in developing countries, international public financial flows should be increased but it is declining even before the COVID-19 pandemic.
- Financial flows have shrunk for the 3rd year in a row but they have become increasingly focused in some small number of countries, the UN bodies further said.
- The decreasing trend in international public financial flows may delay the achievement of SDG 7, especially for the least-developed countries (LDCs), landlocked developing countries, and small island developing states.

WHO Report on Potable Water

A modelling study has been made by the World Health Organization (WHO) on piped potable water across India.

- WHO report says that piped potable water would succeed in preventing close to 4,00,000 deaths from diarrhoea.
- Additionally, this would avoid 14 million DALYS (Disability Adjusted Life Years) from diarrhoea and save close to \$101 billion.
- One DALY represents the loss of the equivalent of one year of full health.
- DALYs for a disease or health condition are the sum of the years of life lost to due to premature mortality and the years lived with a disability due to disease or health condition in a population.

DID YOU KNOW?

A fully functional tap water connection is defined as a household getting at least 55 litres of per capita per day of potable water all through the year. Currently about 12.3 crore rural households, or 62%, have piped water connections up from 3.2 crore or about 16.6% from 2019 when the scheme was launched.

Jal Jeevan Mission

- **Launch year** - 15th August 2019.
- **Ministry** – Ministry of Jal Shakti.
- **Aim** - To provide Functional Household Tap Connection to every rural household i.e., **Har Ghar Nal Se Jal by 2024.**
- It will be based on a **community approach** to water and will include extensive Information, Education and communication as a key component of the mission.
- Currently 5 states (Gujarat, Telangana, Goa, Haryana, and Punjab) and 3 Union Territories (Andaman & Nicobar Islands, Daman Diu & Dadra Nagar Haveli and Puducherry) have reported 100% coverage.



- National Rural Drinking Water Programme (NRDWP), a centrally sponsored scheme has been restructured and subsumed into Jal Jeevan Mission.
- Water is the **State subject**. Thus, the implementation must be done through the States.

Gender Social Norms Index (GSNI), 2023

A recently released UNDP report says Prejudices against women didn't reduce in last decade, 90% people still hold gender bias.

- **Index** - It is released by United Nations Development Programme (UNDP).
- It quantifies biases against women, capturing people's attitudes on women's roles along four key dimensions—political, educational, economic and physical integrity.
- **Findings** - The index, covering 85% of the global population, reveals that close to 9 out of 10 men and women hold fundamental biases against women.
- Gender social norms have persisted for centuries and are pronounced in countries with lower and higher Human Development Index (HDI).
- The latest GSNI report showed little progress, despite global and local campaigns for women's rights in recent years such as Me Too, Ni Una Menos, Time's Up and Un Violador en Tu Camino.
- Biased gender social norms can contribute to lack of equality in political participation.
- Countries with greater bias in gender social norms also show a lower presence of women in parliament.
- On average, the share of heads of state or government who are women has remained around 10 % worldwide since 1995, and women hold just over a quarter of parliament seats globally.
- Women are underrepresented in leadership in conflict-affected countries, mainly at the negotiation tables in the recent conflicts in Ukraine (0%), Yemen (4%) and Afghanistan (10%).
- Globally, about seven of 10 peace processes did not include any women mediators or women signatories.
- Even in the 59 countries where adult women are more educated than men, the average income gap is 39%.
- **Countries with no bias** - Germany, Uruguay, New Zealand, Singapore and Japan.
- 25 % of people believe it is justified for a man to beat his wife.

Global Trends: Forced Displacement in 2022 Report

People forcefully displaced due to violence, climate crises saw the sharpest rise in 2022.

- It is released annually by the Office of the High Commissioner for Refugees (UNHCR).
- **Findings** - The number of people who were uprooted from their hometowns due to social and climate crises in 2022 was 21% higher than in 2021.
- More than 108.4 million people were forcibly displaced by the end of 2022, 30% of them were children.
- Of these, 35.3 million were people who had to move to another country for safety (refugees).
- A large share of refugees were from Ukraine, because of Russia-Ukraine War and the displacement of Ukrainians also was the global fastest since World War II.
- **Displacement** - Climate disasters caused 32.6 million internal displacements throughout 2022 and 8.7 million of the people did not manage to return home by the end of the year.
- Disaster related internal displacement accounted for more than half (54 %) of all new displacements in 2022.

United Nations High Commissioner for Refugees (UNHCR)

- It is a UN Refugee Agency.
- **Aim** - To save lives, protecting rights and building a better future for people forced to flee their homes because of conflict and persecution.
- It serves as the 'guardian' of the 1951 Convention and its 1967 Protocol.
- So far, 146 countries are party to the 1951 Convention, and 147 to the 1967 Protocol.
- Countries that have ratified the Refugee Convention are obliged to protect refugees that are on their territory, in accordance with its terms.
- India is not a member to this convention nor to the protocol.

- At the end of 2022, an estimated 4.4 million people worldwide were stateless or of undetermined nationality, 2% more than at the end of 2021.
- Stateless people are those who are not recognised as citizens by any government.

Detox Development: Repurposing Environmentally Harmful Subsidies

A new World Bank report examines how subsidy reform can help safeguard the world's foundational natural assets.

- As per the report, subsidies for fossil fuels, agriculture, and fisheries exceed \$7 trillion in explicit and implicit subsidies, which is around 8% of global GDP.
- **Inefficient subsidies on fossil fuels** - In 2021, countries shelled out \$577 billion to actively lower the price of polluting fuels such as oil, gas, and coal but this amounted to incentivising the overuse of fossil fuels.
- Consequently, fossil fuel usage leads to air pollution in industrialising middle-income countries which have a high health burden.
- **Agriculture Subsidies** are targeted at farmers for buying specific inputs or growing particular crops.
- The report shows subsidies are favour to wealthier farmers, even when programs are designed to be targeted to reach the poor.
- Inefficient subsidy usage is responsible for up to 17% of all nitrogen pollution in water in the past 30 years, which has large enough health impacts on reducing labour productivity by up to 3.5%.
- **Fisheries** - The fisheries sector receives 35.4 billion per year in subsidies and contributes to overfishing.

ICMR's Recent Report on Diabetes

ICMR's recent study says that India has 101 million people living with diabetes

- **Published by** - The Madras Diabetes Research Foundation and Indian Council of Medical Research (ICMR).
- **Findings** - More than a quarter of the population was either *diabetic* or in *pre-diabetic* stage.
- 11.4% of India's population or 101 million people are living with diabetes.
- **Hypertension** - Around 35.5% of the population or 315 million people are living with the hypertension or high blood pressure.
- **Obesity** - The study found that 28.6% of the population would be considered to be obese as per the BMI measure, 39.5% of the population had abdominal obesity.
- BMI (body mass index) - Generally used as a measure for obesity.
- **Hypercholesterolemia** - 24% of the population were living with hypercholesterolemia (a condition where the bad cholesterol or LDL levels are high).

Diabetes & its Types

- Diabetes is a condition that happens when your blood sugar (glucose) is too high.
- It develops when your pancreas doesn't make enough insulin or any at all, or when your body isn't responding to the effects of insulin properly.
- Diabetes affects people of all ages.
- **Type 1 diabetes** - It is an autoimmune disease in which the immune system attacks and destroys insulin-producing cells in pancreas.
- It's usually diagnosed in children and young adults, but it can develop at any age.
- It is non-curable.
- **Type 2 diabetes** - With this type the body doesn't make enough insulin and body's cells don't respond normally to the insulin (insulin resistance).
- This is the most common type of diabetes.
- It mainly affects adults, but children can have it as well.

Other types

- Gestational diabetes
- Type 3c diabetes
- Latent autoimmune diabetes in adults (LADA)
- Maturity-onset diabetes of the young (MODY)
- Neonatal diabetes
- Brittle diabetes

Global Gender Gap Report, 2023

WEF report says India climbs 8 places from 135 to 127 in global gender index.

Gender gap
India jumped eight spots to rank 127

Rank	Country	Score	Rank change
1	Iceland	0.912	-
2	Norway	0.879	+1
59	Bangladesh	0.722	+12
103	Bhutan	0.682	+23
107	China	0.678	-5
115	Sri Lanka	0.663	-5
116	Nepal	0.659	-20
127	India	0.643	+8
142	Pakistan	0.575	+3

- **Aim** - It annually benchmarks the gender parity OF 146 countries across 4 key dimensions.
 - Economic Participation and Opportunity,
 - Educational Attainment,
 - Health and Survival,
 - Political Empowerment.
- **Released by** - World Economic Forum (WEF).
- **Adoption** - Adopted in 2006.
- It measures scores on a 0 to 100 scale and scores can be interpreted as the distance covered towards parity (i.e. the percentage of the gender gap that has been closed).
- **Global Scenario** - Overall, the Southern Asian region has achieved 63.4% gender parity.
- According to 2023 report no country has yet achieved full gender parity.
- **Iceland** is the most gender-equal country in the world for the 14th consecutive year and the only one to have closed more than 90% of its gender gap.
- **Scenario in India** - India had attained parity in enrolment across all levels of education.
- It had closed 64.3% of the overall gender gap but had reached only 36.7% parity in economic participation.
- There was an increase in parity in wages and income but the shares of women in senior and technical roles dropped slightly compare to 2022.
- On political empowerment, India has registered 25.3% parity, with women representing 15.1% of parliamentarians, the highest for the country since the inaugural report in 2006.
- In sex rate at birth it is increased by 1.9% points compared to the 2022, index.
- Neighbouring Countries that ranks ahead of the India were Nepal, Srilanka, China, Bhutan and Bangladesh.

Children and Armed Conflict Report, 2023

The United Nations (UN) has removed India from its annual list of countries where children are impacted by armed conflict.

- The report includes trends regarding the impact of armed conflict on children and information on violations committed every year.
- **Released by** - United Nations General Assembly and Security Council.
- **Findings** - The highest number of violations were committed in the Democratic Republic of the Congo, Israel, Palestine, Somalia, Syria, Ukraine, Afghanistan, and Yemen.
- The monitoring and verification of grave violations remained extremely challenging owing to access constraints leading to the underreporting and increase in the violations verified in 2022.
- The countries where “the worst deterioration” occurred were Myanmar, South Sudan, and Burkina Faso.
- There were 1,163 attacks on schools recorded, and 647 attacks on hospitals a 112% increase in 2022.

International Convention on the Rights of the Child (ICRC)

- An international treaty that recognizes the human rights of children, defined as persons up to the age of 18 years.
- It establishes that States Parties must ensure that all children without discrimination in any form benefit from special protection measures and assistance.
- **196 countries** have become State Parties to the Convention as of 2015.
- The US and Somalia, have not ratified the Convention.
- **India ratified** the CRC in 1992.
