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SEPTEMBER 2024

1. IMPORTANT TOPICS OF THE MONTH

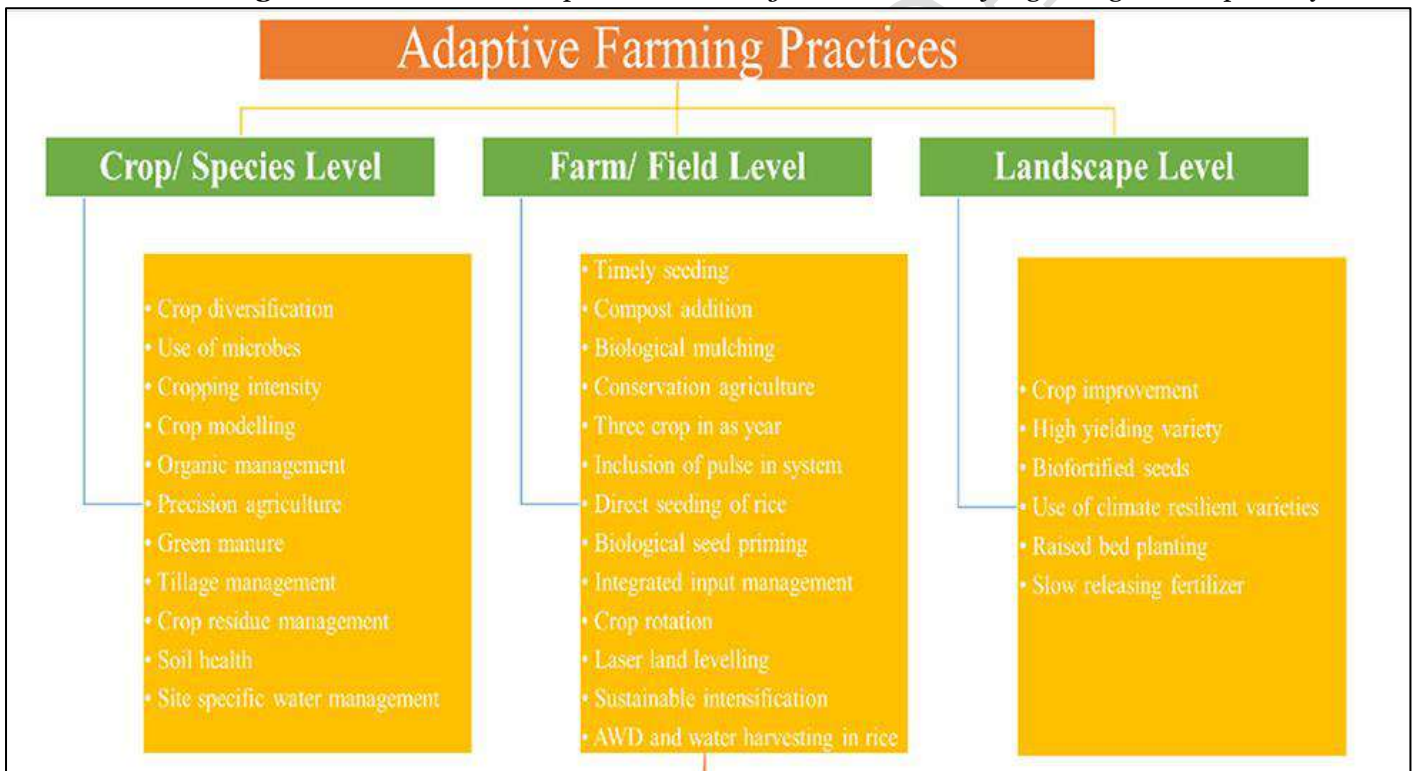
1.1 Adaptive Agriculture

Why in news?

The recent report of Centre for Science and Environment highlights that organic and natural farming offer several advantages over chemical-dependent inorganic methods.

What is Adaptive agriculture?

- **Adaptive agriculture** – It refers to the necessity to *adapt to the reality of climate change* in our world, and to develop food systems to healthily feed our world.
- It acknowledges the need for individuals to develop and grow their own healthy personal relationships with all aspects of food production.
- **Focus** – It aims to increase the *resilience and sustainability of agricultural systems* in response to changing environmental conditions and challenges.
- **Methodologies** – It utilizes a broad spectrum of *strategies and skill-sets for* growing food responsibly.



Examples of Adaptive Agriculture

- **Climate-Resilient Crops**- Developing & using crop varieties that are resistant to extreme weather conditions.
- **Conservation Tillage**- Reducing soil disturbance to maintain soil health and reduce erosion.
- **Agroecology**- Designing farming systems that mimic natural ecosystems and promote biodiversity.
- **Organic Farming**- An agricultural system that uses natural inputs & processes to produce crops and livestock.
- It avoids synthetic chemicals, such as pesticides, fertilizers, and genetically modified organisms (GMOs).
- **Natural Farming**- It is often associated with the philosophy of Japanese farmer Masanobu Fukuoka, emphasizes minimal human intervention and allows nature to take its course.
- It is often called "do-nothing farming."

To know more about Climate Smart Agriculture, click [here](#)

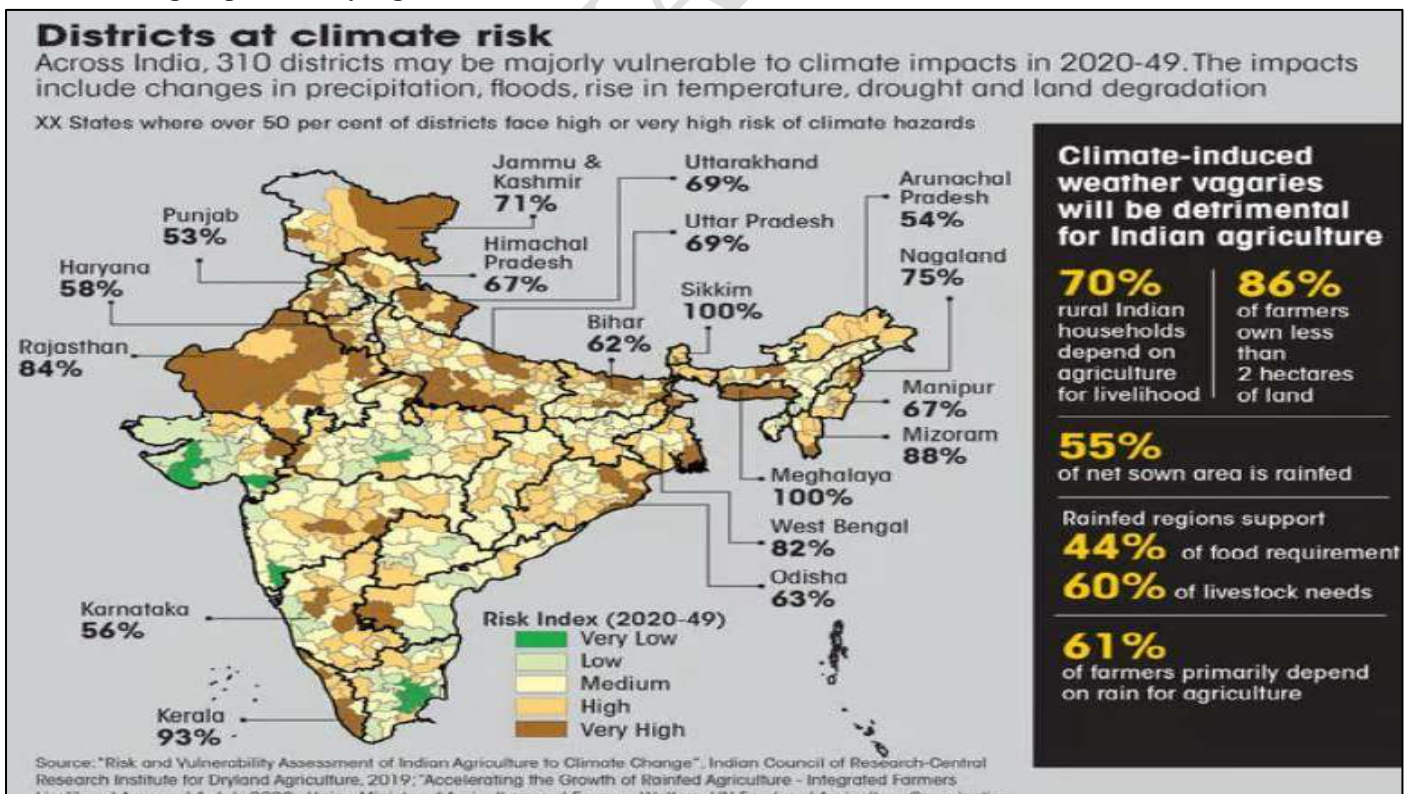
What are its benefits?

- **Increases water holding capacity** – Sustainable agriculture practices *make the soil porous*, thus enabling it to hold more water.
- **Better growth of plants** – The porous soil allows the *roots to go deeper and absorb more nutrients*.
- **Build resilience** – *Increased microbial health of soil* leads to aggregate stability, making plants stronger and resilient to any weather changes.
- **Enhance productivity**- It can potentially enhance agricultural productivity through improved practices and technologies.
- **Economic viability**- It helps farmers to better manage risks and uncertainties, leading to *more stable incomes and livelihoods*.
- **Promote sustainability** – It *promotes long-term sustainability* by reducing environmental impact & conserving natural resources.



Why India needs adaptive agriculture?

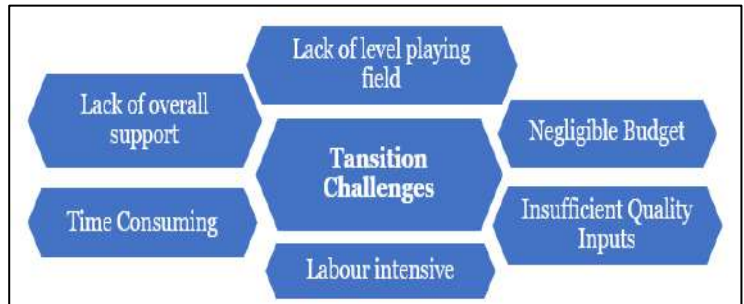
- With a 1.4 billion population, 7500km vast coastline, and 58% of the population with agricultural dependence, India is particularly susceptible to climate change.
- **Increased extreme weather events** – The *Global Climate Risk Index of Germanwatch*, identifies India as one of the top countries that suffered most from extreme weather events during 2000-19.
 - It is alarming as *agriculture employs 42.3%* of the country's population and has a *share of 18.2% in its GDP*, according to the "**Economic Survey 2023-24**".
- **Elevated climate risks** - ICAR found that *90% of India's districts face climate risks*, with 54% categorized as having "high" or "very high" risk.



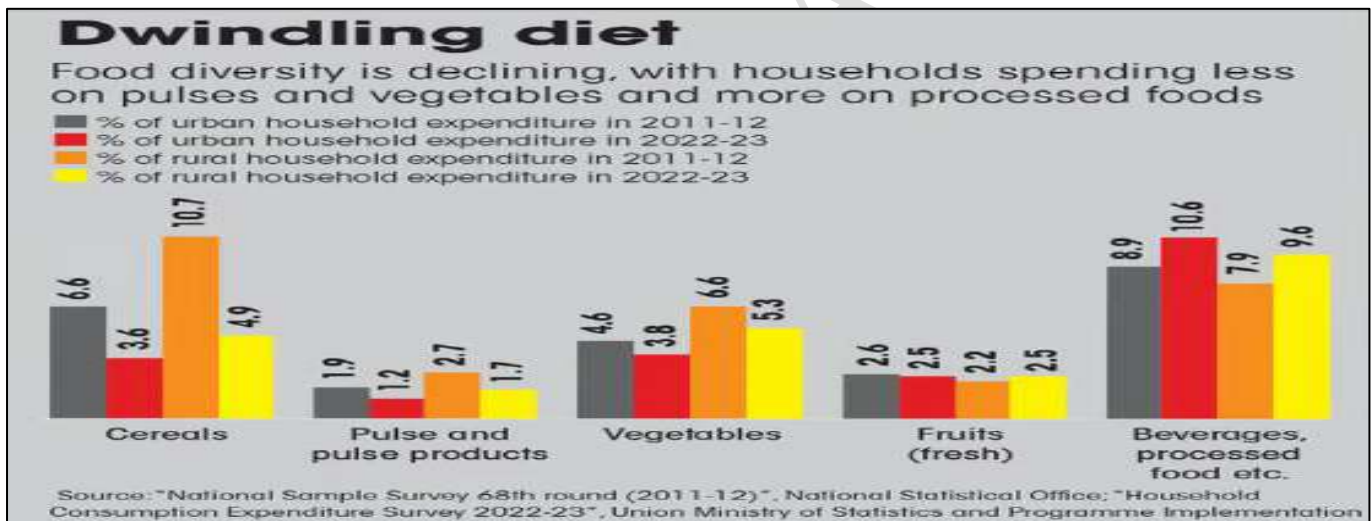
- **Agricultural vulnerability** – *55% of the net sown area relies on rainwater*, making it highly vulnerable to climate change.
 - As of 2022, these *rainfed regions, meet 44% of the country's food requirement* and support 60% of the livestock.

- Thus, a substantial part of food security and the livelihood of 61% of farmers who rely on rainfed agriculture depends on whether the rain arrives at the right place at the right time in the right quantities.
- **Rural vulnerability** – Almost 70% of rural households depend on agriculture, with 86% being small and marginal farmers.

What are the challenges in implementing it?



- **Adoption challenges** - As per government data, till March 2023,
 - Combined organic area – 4.2% of the net sown area of the country
 - Organic farmers – 3% of the 146 million agricultural landholders
- **Lack of quality inputs** – Farmers find it difficult to prepare organic and bio-inputs due to lack of knowledge and availability of inputs, and due to the time and labour needed for it.
- **Unfair returns** – Issues in securing fair and remunerative prices.
- **Practical difficulties** – There are ineffectiveness of the recommended package of practices in different ground-level scenarios.
- **Marketing issues** - Small and marginal farmers face challenges in marketing their produce due to lengthy supply chains, poor value addition and lack of economies of scale.
 - They produce 70% of vegetables and over 50% of fruits and cereals.
- **Current MSP system** - It primarily supports wheat and rice, promotes monoculture, strains water resources, and reduces crop diversity which impacts farmer’s resilience.



What are the measures taken by the government?

- **National Initiative on Climate Resilient Agriculture** – It was launched in 2011, spearheaded by ICAR-Central Research Institute for Dryland Agriculture (CRIDA).
- It aims to improve production and risk management technologies.
- CGIAR Research Program on Climate Change, Agriculture, and Food Security, a large-scale intervention on climate-smart agriculture that was launched in 2010.
- It was implemented on a pilot basis in Bihar, Haryana, Punjab, Maharashtra, Telangana and Madhya Pradesh.
- **National Mission for Sustainable Agriculture** - NMSA was launched in 2014-15, to make agriculture more productive, sustainable, and climate resilient.
- **Paramparagat Krishi Vikas Yojana**- It is under NMSA, aimed at promoting organic farming practices.
- **Mission Organic Value Chain Development for North East Region**- It is aimed at promoting organic farming in the northeastern states of India.
- It seeks to develop a comprehensive organic value chain in the region, which includes production, processing, marketing, and consumption.

National Initiative on Climate Resilient Agriculture India's first programme to enhance climate resilience of agriculture.

- **National Mission on Natural Farming-** The aims to promote *natural farming practices across the country*.
- It encourages a shift towards farming methods that enhance soil health, reduce dependency on chemical inputs, and improve sustainability in agriculture.
- **National Cooperative Organics Limited-** In *2023*, the Union Ministry of Cooperation launched NCOL to *enhance the marketing of organic produce* through cooperatives.
- It introduced the "**Bharat Organics**" to improve their sale.
- **Bio-input Resource Centres-** These are planned under the NMNF to address the gaps in knowledge, availability of inputs, and support for preparing organic and bio-inputs.
 - Union Budget 2024-25 proposes setting up *10,000 bio-input resource centres* and to include 10 million farmers in natural farming over the next two years, supported by certification and branding.
- **Promoting FPOs** – Both the Union & states have been promoting formation of Farmer Producer Organisations.
- A 2020 scheme to establish and promote *10,000 FPOs by 2027-28*, with a budget of Rs 6,865 crore.

States like Karnataka, Odisha and Uttarakhand already procure organic produce and link it with the public distribution system and the Integrated Child Development Scheme.

State Government Initiatives	
Andhra Pradesh	<ul style="list-style-type: none"> • Andhra Pradesh Community Managed Natural Farming (APCNF)- It aims to make natural farming more climate-resilient and lucrative. • It is the <i>largest natural farming programme</i> in India and globally in terms of farmer enrolment.
Haryana	<ul style="list-style-type: none"> • Mera Pani Meri Virasat – To <i>incentivize crop diversification</i> with procurement under MSP.
Odisha	<ul style="list-style-type: none"> • Millet Mission - It promotes millet cultivation with <i>incentives and procurement guarantees</i>.
Karnataka	<ul style="list-style-type: none"> • Raitha Siri - It supports organic farming with incentives and procurement for millets, pulses, and oilseeds.
Maharashtra	<ul style="list-style-type: none"> • Project on Climate Resilient Agriculture (POCRA) • It focused on water security, protected cultivation, agri-enterprises, and value chain strengthening. • Subsidies are given via Direct Benefit Transfer (DBT).

What lies ahead?

- Introduce MSP for all crops under a legal framework.
- Invest in R&D to develop climate-resilient crops, innovative irrigation techniques, and soil management practices tailored to diverse agro-ecological zones.
- Encourage collaboration between government, private sector, and research institutions to drive innovation and scaling of adaptive agriculture solutions.
- Leverage digital technologies such as precision agriculture, remote sensing, and data analytics to enhance decision-making and resource management.

1.2 Disaster Management Amendment Bill, 2024

Why in News?

Recently, the Disaster Management (Amendment) Bill, 2024 was introduced in Lok Sabha.

What is Disaster Management Act?

- **Disaster** - Disaster Management Act defines a “disaster” as “a catastrophe arising from natural or manmade causes resulting in substantial loss of life or damage to property *beyond the coping capacity of the community of the affected area*”.

- **Disaster Management** - India envisions to develop an ethos of Prevention, Mitigation, Preparedness and Response.
- **Disaster Management Act**– It was **enacted in 2005** in the backdrop of several catastrophic disasters such as Tsunami (2004), Gujarat Earthquake (2001) and Odisha Super Cyclone (1999).
- **Institutional mechanism** – It entails the establishment of the Disaster Management Authority and Disaster Management Plans at national, state and district level.
- **Functions of NDMA & SDMA** – They review the disaster management plans of government departments.
- They set guidelines for preparation of plans for authorities below them and recommend provision of funds for disaster mitigation.
- **Committees** – It provides for constitution of a National Executive Committee and a State Executive Committee to assist NDMA and SDMA in performing their functions.
- **National Disaster Response Force**- It has several battalions or teams, which are responsible for on-ground relief and rescue work in several states.

Institutional Mechanism	Authority	Head
	National Disaster Management Authority (NDMA)	Prime Minister
	State Disaster Management Authority (SDMA)	Respective Chief Ministers
	District Disaster Management Authority (DDMA)	Either District Magistrate or District Collector

What are the new provisions of the bill?

- **Preparation of disaster management plans** – It shall be done by NDMA and SDMA.
- **Empowers NDMA** – It can make regulations under the Act with prior approval of the central government.
- **New functions to NDMA and SDMA** - It adds new function like
 - Taking periodic stock of disaster risks, including emerging risks from extreme climate events.
 - Providing technical assistance to authorities below them.
 - Recommending guidelines for minimum standards of relief.
 - Preparing national and state disaster databases, respectively.
- **Empowers state government** – To constitute a separate **Urban Disaster Management Authority** for state capitals and cities with a municipal corporation.
- **Urban Authority** – It will prepare and implement the disaster management plan for the area under it.
- It will comprise chairperson, vice chairperson and other members specified by the state government.
 - **Chairperson** - Municipal Commissioner
 - **Vice Chairperson** - District Collector
- **Creation of Disaster database** - It will contain information on
 - The type and severity of disaster risks
 - Allocation of funds and expenditure, and
 - Disaster preparedness and mitigation plans
- **Statutory status** – It provides statutory status to existing bodies such as the
 - National Crisis Management Committee (NCMC)
 - High Level Committee (HLC)
- **NCMC** - It will be the nodal body for dealing with major disasters with serious or national ramifications.
- The Cabinet Secretary will serve as the chairperson of NCMC.
- **HLC** - It will provide financial assistance to state governments during disasters and will approve financial assistance from the National Disaster Mitigation Fund.
- Minister of the department with administrative control over disaster management will serve as chairperson of the HLC.

State Disaster Response Force (SDRF), a mechanism that is already in operation in several states like Odisha and Gujarat.

- **Creation of SDRF** – It empowers the state to constitute a State Disaster Response Force (SDRF) and to define their functions and prescribe the terms of service for its members.

	Existing provisions	Bill provisions
Disaster Management Plans	<ul style="list-style-type: none"> • Prepared by – NEC and SEC national and state levels, respectively. • Approved by - NDMA and SDMA approve the respective plans. 	<ul style="list-style-type: none"> • Prepared by – NDMA and SDMA for national and state levels.
Appointments to NDMA	<ul style="list-style-type: none"> • The central government will provide NDMA with officers, consultants, and employees, as it considers necessary. 	<ul style="list-style-type: none"> • It empowers NDMA to specify the number and category of officers and employees, with previous approval of the central government. • NDMA may also appoint experts and consultants as necessary.

What are the potential benefits of the bill?

- **Strengthens authorities** – It enhances the capabilities of the NDMA and SDMA in preparing disaster management plans.
- Statutory status to pre-existing organizations can potentially streamline the chain of command & improve coordination during disasters.
- **Promotes decentralisation** – Establishing of Urban Disaster Management Authorities empowers local authorities in disaster management in urban areas.

What are the issues in the bill?

- It left out several key aspects that are vital in the aftermath of a disaster like ensuring that disaster relief is a justiciable right.
- **Centralisation** - It enhances the central government's power in making decisions that could *diminish the independence of state* and local authorities.
- **Delayed response** – This *top-down approach* leads to a delayed response to disasters.
- **New decentralisation problems** – Creation of Urban Disaster Management Authority *without the necessary financial devolution* creates more problems than it solves.
- **Dilutes NDRF** – It dilutes the wording of the NDRF by removing the purposes for which the fund shall be used.
- There is excess *centralisation of decision making on funds*, especially in situations where the disaster is severe.
 - A delayed response was witnessed when the disaster relief funds from the NDRF were denied to Tamil Nadu and disbursed much later to Karnataka.
- **Restricted definition of "disaster"** – It does *not classify heatwaves as a notified disaster* under the DMA 2005 despite their growing impact.
 - According to the Indian Meteorological Department, rising heatwave days caused 10,635 human deaths due to heat or sunstroke in 2013-2022.
- **Non-inclusion of climate induced risks** - There is a provision titled 'emerging disaster risk' but it does not provide scope to fully integrate climate change into disaster management.
- **Lack of mechanism for coordination** – It offers no further clarity on how to achieve coordination among a diverse set of institutions including non-government, private and general public.
 - The recent disasters like labourers stuck in the under-construction *Silkyara tunnel or the landslides in Wayanad*, have both brought to the fore the importance of coordination in disaster governance.

The current notified list of disasters eligible for assistance under the National Disaster Response Fund/State Disaster Response Fund are cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst, pest attack, frost and cold wave.

What lies ahead?

- Encourage a collaborative approach between the central & State governments in disaster management.
- Ensure financial resources are allocated to State & local authorities to enable effective disaster response.
- Broaden the definition of disaster to include climate-induced disasters like heatwaves.
- Incorporate lessons learned from previous disasters to improve disaster management practices.
- Empower local communities to participate in disaster preparedness and response efforts.

1.3 Gender Budgeting in India

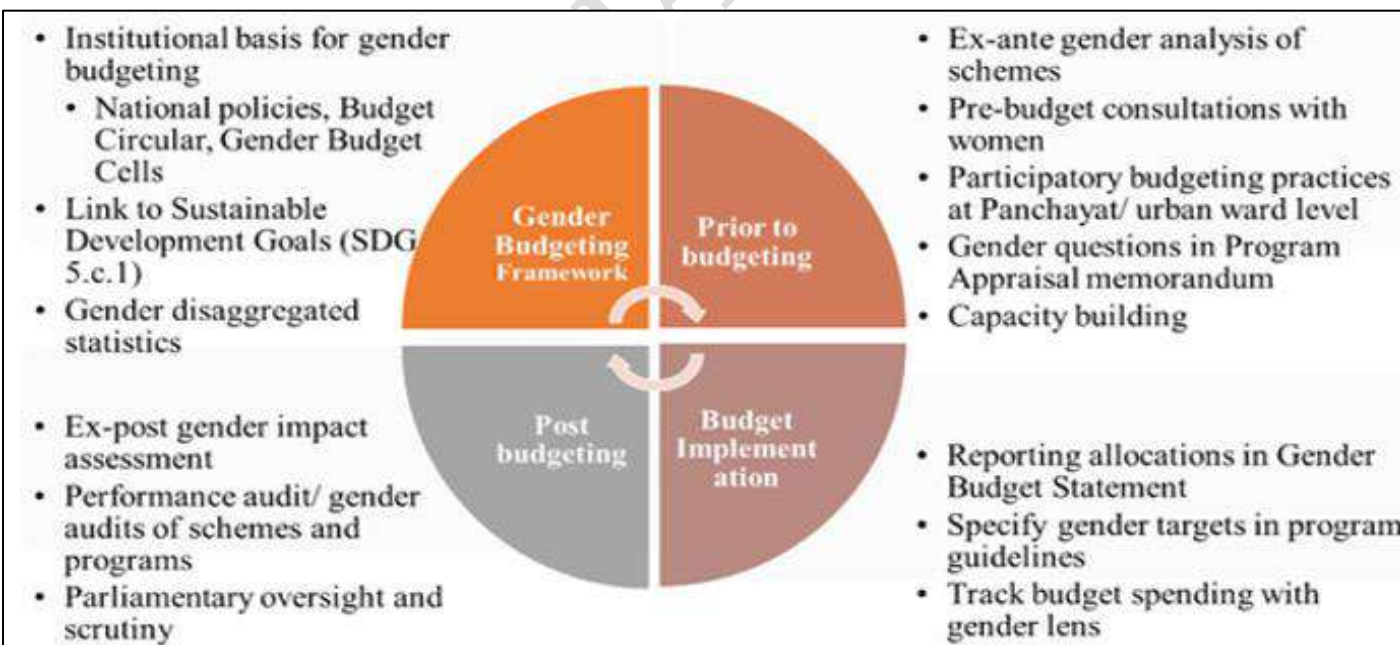
Why in News?

The Gender Budget reached 1% of GDP in the Budget 2024-25 for the first time, and overall allocations currently stand at more than ₹3 lakh crore for pro-women programmes.

What is Gender Budgeting?

- **Gender Budgeting** – It is a public finance tool to allocate money in programs/schemes/initiates that attempt to reduce gender disparity.
- **Features** – It is an *outcome oriented expenditure*.
- It is a *tax based incentives* for women and girls.
- It is a dissection of the government budgets to establish gender differential impacts.
- It ensures that *gender commitments are translated into to budgetary commitments* through monitorable targets.
- It is **not a separate budget for women** and not about spending the same on men and women.
- **Approaches**
 - Needs-based Gender Budgeting
 - Gender-assessed Budgets
 - Gender-informed resource allocation

Gender Budgeting was introduced in Australia in 1980's and is currently implemented in more than 100 countries.



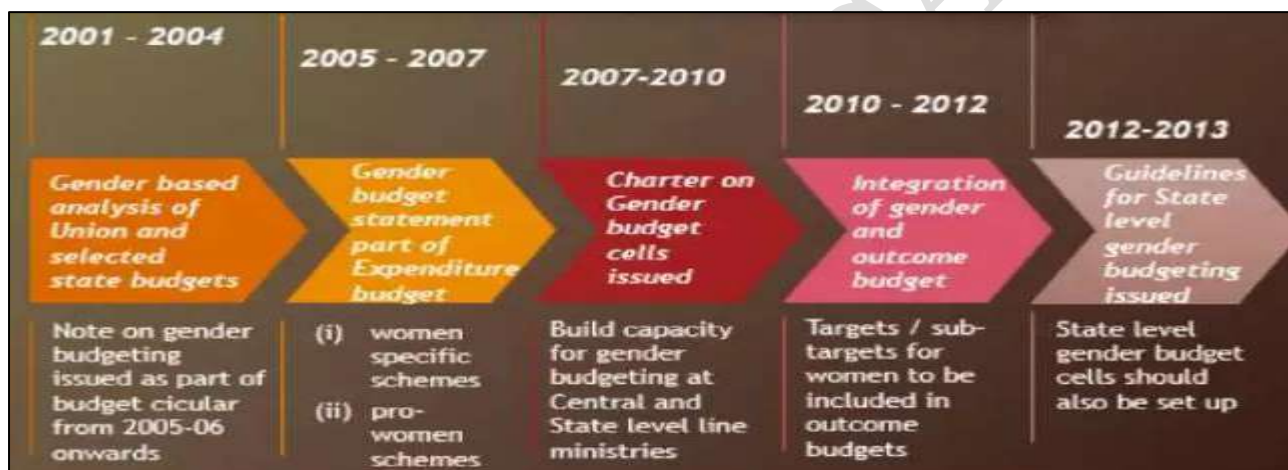
How gender budgeting works in India?

- **Introduction** - It was **first introduced in 2005-06**, with an average share of *5% of the total budgetary allocation*.
- **Gender Budgeting Cells** - In 2004-05, Ministry of Finance, mandated the setting up of Gender Budgeting Cells in all Ministries/Departments.
- **Gender Budget Statement** – It is an important tool of Gender Responsive Budgeting that *presents budget allocations and public expenditure* for gender equality and women's empowerment.

- The Government *publishes it annually* along with the Union Budget.
- It disaggregates the government's budget according to its differential impact on women and men.

Components of Gender Budgeting Statement		
Part	Statement	Schemes
A	It reports expenditures in schemes with <u>100% allocation for women.</u>	Namo Drone Didi, Prime Minister's Girls' Hostel, Safe City Projects, Nirbhaya Fund Transfer, DISHA Programme for women in science etc.
B	It reports programmes with allocations of <u>30-99% for women.</u>	Krishonnati Yojna, PM Schools for Rising India, Samagra Shiksha, PM POSHAN etc.
C	It reports pro-women schemes with <u>less than 30%</u> provisioning for women.	PM Kisan Yojana

- **Gender Budgeting Scheme** - It is implemented by Ministry of Women & Child Development Since 2007-08
- It aims to provide financial grant-in-aid to government departments, national and state training institutes and organisations to conduct training & workshops on gender budgeting.



Status of Gender Budgeting in Budget 2024-25

- **Total amount allocated to women** –It reached 1% of GDP in the Budget 2024-25 for the first time.
- **Increased Allocation** – It share in total Union Budget increased to 6.5% in 2024-25 from 5% in 2023-24
- Gender Budget in FY 2024-25 increased by 38.6% more than budget estimates of 2023-24.
- **Newer inclusion** - Ministry of Power and Ministry of Civil Aviation reported for the 1st time in this year budget.
- **Increase in Part A** – It had previously constituted 15-17% of overall allocations in the GBS till BE 2022-23.
- Since BE 2023-24, it is increased to almost 40%.
- **Major Allocated areas** - Nearly 3/4th of the gender budget is allocated to
 - Rural employment under the MGNREGA
 - Affordable housing
 - Education of the girl child,
 - Nutrition
 - Access to water supply

What are the benefits of Gender Budgeting?

- GB seeks to view the Government Budget from a gender perspective in order to assess how it will address the different needs of women.
- **Gender Equality** - Gender responsive budgeting is a powerful tool to close the gender gaps in an economy.
- **Equal Resource Allocation** – It is a means of ensuring that public resources are allocated in an equitable way to meet the needs of specific gender groups are satisfied.
- **Gender mainstreaming** – Budget is used as an entry point to apply a gender lens to the entire policy process.
- **Continuous Process** - It must be applied to all levels and stages of the policy process.
- It facilitates a gender sensitive analysis in the formulation, implementation and monitoring of policies, programmes and budgets (expenditure and revenue).
- **Monetary Need** – It recognizes the monetary requirement needed to get desired outcomes from gender sensitive legislations, programmes and schemes.
- **Monitoring the achievement of policy goals** – Gender Budgeting is a tool to monitor the achievement of the goals of the National Policy for Empowerment of Women 2001 and other policy goals in a gender-aware manner.
- **Improves efficiency** -Investing more on women improves social status and make the process of development more efficient and result-oriented.

What are the challenges in Gender Budgeting?

- **Over/under reporting** - 100% reporting of PM Awas Yojana (PMAY) Under Part A instead of part B.
- Beginning last year, the entire allocation of PMAY has been reported under part A, whereas only a part of PMAY was reported under Part A earlier.
- Such reporting of PMAY may not be entirely accurate as not all beneficiaries are women.
- **Misallocation** – It deflates the amount spent by programmes on women's needs.
- This year for the first time the entire allocation to the National Rural Livelihoods Mission (NRLM) is reflected in part A of the GBS which is technically correct.
- In 2023-24BE, only 50% of the scheme's total outlay used to be reflected in part B of the GBS.
- **Missed allocation** - Pro-women allocations in the schemes for women entrepreneurs such as PM Vishwakarma, SVANidhi, and Stand-Up India are missed out.
- **Ineffective implementation of schemes** - MGNREGS, which has the third highest allocation among schemes for women in the GBS, is currently reported under part B.
- Women constituted 59.3% of all person days under MGNREGA as of December 2023, and should have received commensurate wages yet only 33.6% gets reflected in the GBS.
- **Lack of scientific and systematic approach** - The above anomalies in reporting are reflections of the GBS still not having a scientific and systematic approach.
- **Lack of Explanation** – GBS reported an allocation of ₹920 crore for PM Employment Generation Programme (PMEGP), without providing any explanation.
- **Data issue** - Ensuring sex disaggregated data in the gender-neutral sectors remains a major challenge.

What lies ahead?

- Incorporate explanations for entries made in the GBS will ensure accounting accuracy and minimise anomalies.
- Conduct gender audits for improved gender outcomes in government programmes.
- Ensure actual spending for women in all government programmes.
- Strengthen our Gender Budgeting Cells to ensure systematic process.
- Collect gender disaggregated data to continuously track the progress.

1.4 Plant Pandemics

Why in news?

Plant pandemics have been forecasted as the next big contagion and posing threats to global food security.

What is Plant pandemic?

- **Plant pandemic** - It is the disease outbreak that spreads across continents or subcontinents and causes mass mortality in plants.

Major Pandemic Plant Diseases and Outbreak			
Disease	Pathogen	Origin	Outbreak
Wheat blast disease	Mangalore oryzae Triticum (Moot) - Fungus	South America - Brazil	In Bangladesh in 2016 and 2018 outbreak in South Africa and Zambia
Banana Fusarium Wilt	Fusarium oxysporum - Soil fungus	Central America	By 1960, it spread to tropical America, the Caribbean and West Africa
	Fusarium Tropical race 4	Taiwan, East Asia	Spread to 20 countries, including India
Maize lethal necrosis	Combination of 2 viruses—maize chlorotic mottle virus (MCMV) & sugarcane mosaic virus (SCMV)	United States in the 1970s.	Now prevalent in Rift valley region East Africa, Southeast Asia, and South America.
Coffee leaf rust	Fungus Hemileia vastatrix	East Africa	Spread to all coffee cultivation areas in Asia, the Americas and Africa
Cassava brown streak	Cassava brown streak virus	Tanzania in 1935	Now spread to central and southern Africa.
Late blight disease - Tomato & potato	Fungus Phytophthora infestans		In India, the disease continues to cause outbreaks since the 1800s.
Citrus tristeza disease	Closterovirus	First recorded in Argentina in the 1930s	Spread to South Africa, West Africa and California

What are the factors driving plant pandemics?

- **Climate Change** – With the consequent expansion of warmer and more humid conditions to higher latitudes, *tropical diseases are spreading* to temperate and higher latitudes.
- **Higher global trade** - *Introduction of foreign crops* and flow of agricultural produces across the globe enables the pathogens to spread across the globe favouring disease outbreak
 - In the *1980s, citrus plants infected by Citrus tristeza virus* were shipped in vast numbers to unaffected countries, leading to a large-scale infestation and extending the pandemic.
- **Increased industrial Farming** – *Large scale mono cropping pattern* facilitates the quick spread of the pathogen across the field.
 - High-density monocultures soybean and wheat are *compromised by the fungus Phakopsora pachyrhizi*.
 - Wheat blotch caused by the fungus Zymoseptoria tritici.

What are the impacts of plant pandemic?

- It could provoke a humanitarian crisis that could deprive people of livelihood and lead to widespread hunger.
- **Threats global food security** – Plant pandemics affects the yields of diverse food crops and cause food shortage across the globe
 - Yield losses of more than 50% have been documented during severe epidemics.
- **Famine** – Plant pandemics causes famine and large-scale death
 - **1943 Bengal famine** - Caused by Cochliobolus miyabeanus, a brown spot disease in rice led to the death of over 2 million people.
- **Loss of Livelihood** – Farmers lose their livelihood and are pushed to poverty.

Fungal disease outbreak could reduce global wheat production by 13% by 2050.

- **Promote out migration** – Loss of crops causes farmers and people to migrate to other regions for food and livelihood.
 - Between 1845 and 1852, *Phytophthora infestans* wiped out potato crops in Ireland, resulting in famine & mass migration.
- **Damage ecosystem** – Pathogen outbreak disrupts the natural food web and ecosystem functions.

Impact of Climate Change in Plant Pandemic

- **Support pathogen transmission** – Extreme weather events like hurricanes can transport pathogen spores over continents.
 - In a warming climate, wheat blast will spread to countries that so far remain untouched.
- Rise in global warming from 1.5°C to 4°C is expected to increase the risk of Pierce's disease.
- **Reduce plant immunity** – Elevated temperatures can suppress plant immunity, leading to increased pathogen infection.
- **Increase virulence** – Elevated carbon dioxide levels in the atmosphere are also seen to increase the severity of certain pathogens.
 - For example, powdery mildew that infects gourds.

What are the challenges in controlling plant pandemic?

- **Ineffective fungicides** – Existing fungicides are ineffective in controlling these newly evolved pathogens.
- **Increasing resistance** – High usage of fungicides is making the pathogens like *Magnaporthe oryzae* *Triticum* to develop higher resistance to those fungicides.
- **Complexity pathogen** – Physiological and genetical complexity of the pathogens makes it difficult to understand their interaction with the target crops.
 - For example, in case of MoT fungal infection, there is difficulty in deciphering the gene responsible in MoT or in wheat that confer durable resistance to it.
- **Evolution** - Pathogens are evolving fast to reproduce quickly infect new hosts.
- As the fungus spreads to wider geographies, it may evolve to become more virulent or infect other species.
- **Inter species spread** – Some pathogens could jump to other crops.
 - For instance, pathogens may jump from wheat to paddy.

Pierce's disease is a bacterial disease that affects grapevines and can cause epidemics in vineyards of southern Europe, particularly in France, Italy and Portugal

Magnaporthe oryzae Triticum (MoT), a fungus that attacks wheat crops and can wipe out the entire harvest in a matter of days.

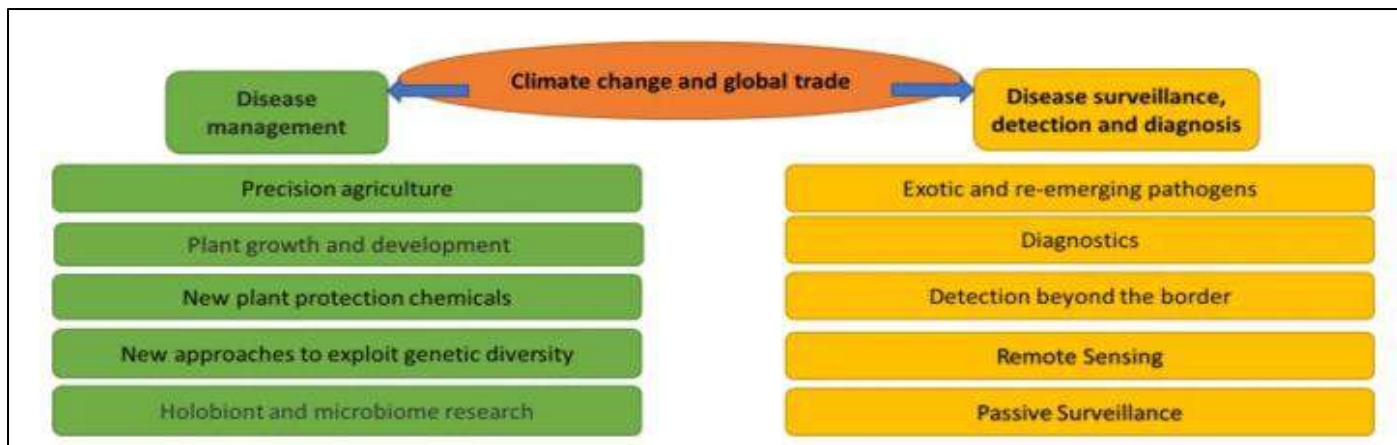
Measures by India to Tackle *Magnaporthe oryzae Triticum* (MoT)

- **Burning infected crops** – The state's agriculture department directed farmers in the villages, which had reported wheat-blast-like infection, to set fire to the standing crops to prevent the fungal spores from spreading further.
 - 400 ha of wheat fields were reportedly set ablaze.
- **Declaration of Wheat holiday** - Since the fungus can survive on seeds for up to 22 months, the government also announced a "wheat holiday" for three years in the state.
- **Banned cultivation** – India have banned cultivation of the crop within 5 km of the border with Bangladesh.
- **Enhanced surveillance** – The Border Security Force was also instructed to keep a vigil on grain trading.
- **Growing alternative crops** – Farmers in the border villages of West Bengal are reluctant to grow wheat and are shifting to banana, maize and lentils.

What lies ahead?

- Diversify crops to limit the outbreak and yield loss.

- Create genetic libraries of crops and pathogens to mitigate the future risk.
- Screen seeds and certify them for the fungus and quarantine measures to help thwart its spread to other countries.
- Model the global food system using advanced technologies like data analytics to forecast the disease outbreak in plants.
- Implement a greater disease surveillance by improved detection.



1.5 Small Scale Industries

Why in news?

Small Industry Day is observed in India every year on August 30 that recognises the contributions of small businesses and industries to the economy.

What are small scale industries?

- The terms Small Scale Industry (SSI) and micro, small, and medium enterprise (MSME) are often used interchangeably.
- The ***MSME Development Act of 2006*** was created to help the growth, expansion, and competitiveness of MSMEs or SSIs.

Classification of Industries			
Classification	Micro	Small	Medium
Investment	Not more than Rs.1 crore	Not more than Rs.10 crore	Not more than Rs.50 crore
Annual Turnover	Not more than Rs. 5 crore	Not more than Rs. 50 crore	Not more than Rs. 250 crore

- **Responsibility** - The State Governments have the primary duty for the development and promotion of these small industries.
- **Characteristics**



- **Village and Small Industry (VSI)** – It is the colloquial term for unorganised traditional sectors and small-scale industries.
- The seven sub-sectors that make up the VSI sector are handicrafts, handlooms, Khadi and Village Industries, Coir, Sericulture, Power Looms, and Small Scale Industries.

The United Nations General Assembly officially designated June 27 as MSME Day.

What is the role of small industries in the Indian Economy?

- It forms a significant part of the economic structure of the nation.
- **Supports wide range of industries** – It includes modern small-scale industries, unorganised traditional industries, and organised big and medium-sized businesses.
 - SSIs make up *about 95% of all industrial units*.
- **Growth of entrepreneurial activities** - Small industries' innovative business practices have aided in expanding the influence of entrepreneurial activities.
- **Generates employment** – creating large employment opportunities at a significantly lower capital cost than large industries.
 - According to MoSPI, it *employs about 175 lakh people*.
- **Promote market growth** – They offer a wider variety of goods and services satisfying both local and international consumer needs.
- **Industrialisation of rural and underdeveloped areas** - They have lowered regional imbalances and ensured a more equitable distribution of wealth and income across the country.
- **Boosts economic growth** - At present, SSIs contribute *nearly 40% of the gross industrial value* added to the Indian economy.

Mahatma Gandhi said that “The salvation of India lies in cottage and small scale industries”.

What are the initiatives taken to promote small scale industries?

- **Collateral-Free Credit Provision** – It is to be offered by the banks and other financial institutions (including NBFCs).
- **SFURTI** - Scheme of Fund for Regeneration of Traditional Industries was launched *in 2005* to create competitive, long-term sustainable employment opportunities
 - For traditional industries & artisans by organising them into clusters.
- **MSME Champions Scheme** – It has been formulated through Standing Finance Committee (SFC) by *merging all 6 components* of erstwhile *Technology Upgradation Scheme* (TUS).
 - It is for a period of **5 years** i.e 2021-22 to 2025-26.
 - It implements Credit Linked Capital Subsidy and TUS for promoting competitiveness amongst MSMEs.
 - It consists of *three parts*
 - MSME-Sustainable (ZED) Certification Scheme
 - MSME-Competitive (Lean) Scheme
 - MSME-Innovative (for Incubation, IPR and Design) Scheme
- **Greening MSME**- It was *launched by SIDBI* (Small Industries Development Bank of India) to provides financial assistance with a maximum limit of INR 20 crores to MSMEs.
 - It enable the MSMEs to *implement energy-efficient* and environmentally sustainable technologies.
- **PMEGP** - Prime Minister's Employment Generation Programme was launched *in 2008* implemented by Khadi and Village Industries Commission (*KVIC*).
 - It aims to create jobs by *establishing new microbusinesses*, projects, and self-employment endeavours in both rural and urban sections of the nation.
- **ASPIRE** - A Scheme for Promotion of Innovation, Rural Industry & Entrepreneurship to continue from **2021–2022 to 2025–2026**.

Funding Schemes	Employment Generation Schemes
<ul style="list-style-type: none">• Collateral-Free Credit Provision for MSME• Scheme of Fund for Regeneration of Traditional Industries (SFURTI)• MSME Champions Scheme• Greening MSME	<ul style="list-style-type: none">• Prime Minister's Employment Generation Programme (PMEGP)• A Scheme for Promotion of Innovation, Rural Industry & Entrepreneurship (ASPIRE)• Entrepreneurship and Skill Development Programmes (ESDP)

- It aims to reduce unemployment and generate jobs, encourage India's entrepreneurial culture and innovation to boost the MSME sector's competitiveness.
- **ESDP** - Entrepreneurship and Skill Development Programmes aims to encourage young people from a variety of social backgrounds.
 - It includes women, SC/ST, disabled people, ex-servicemen, and BPL individuals, to think about a career in self-employment or entrepreneurship.

What are the challenges?

- **Lack of financial access** – Indian MSMEs face a total financing shortfall estimated to reach \$400 billion.
- **Unorganised nature** - As a result of its fragmented structure and small-scale businesses, they are one of the most susceptible in the country's economy.
 - Millions of MSMEs were closed due to decreased demand brought on by the COVID-19 lockdown.
- **Challenges of green transition** - It is necessary to acknowledge that their exposure to policy and demand uncertainties is greater on the downside than on the upside.
- Majority of them are too financially and technically limited to invest in new actions.
- **Lack of regulations** – There is no strategic plan to enable MSMEs to deal with transition risks from traditional base to greener eco-friendly process.

What lies ahead?

- Encourage governments, business groups, civil society organisations, and others to take an active role in raising awareness, sharing best practices, and offering training and resources.
- Provide financial incentives, such as tax breaks, subsidies, grants, and low-interest loans, to encourage MSMEs to adopt sustainable practices or invest in sustainable technologies.
- Larger firms can help MSMEs implement sustainable practices by providing training, technical assistance, and financing.
- Evaluate environment policies first for their effect on MSMEs before implementing it.
- Encourage SMEs to follow simple compliance by taxing negative externalities and providing subsidies or tax breaks for green expenditures.
- Adopt good practices such as low energy strategies, renewable, waste management, safety of women, and timely wage payment.

1.6 India Singapore Bilateral Relations

Why in News?

Recently, Indian Prime Minister has visited Singapore during the second leg of a two-nation trip to South-East Asia.

What are the pillars of India -Singapore relationship?

- **Historical Connection** - Pre-colonial Singapore was part of Indian Kingdoms like Srivijaya and the Majapahit.

Singapore

- Officially the Republic of Singapore, is an island country and city-state in maritime Southeast Asia.
- **Location** – It is located off the southern tip of the Malay Peninsula, bordering the Strait of Malacca to the west, the South China Sea to the east, and the Straits of Johor in Malaysia to the north.



- **Colonial Connection** – Singapore was a crown colony governed from Kolkata till 1867.
- Both the countries have shared colonial history which is reflected in institutions and practices, usage of English and presence of a large Indian community.
- **Political Relations** - India was one of the first countries to recognize Singapore.
- The diplomatic relations were established in 1965.
- Singapore is a **gateway for India** into Asia-Pacific and Southeast Asia and is an important partner in India's **Act East Policy** and Indo-Pacific vision.
 - **Consular Services** - Regular Foreign Office Consultations had begun in 1999.
 - GOI introduced "Tourist Visa-on-Arrival" in 2010 for Singapore.
 - **Strategic Partnership** - India-Singapore relations were elevated to Strategic Partnership in 2015.
 - **High-Level Exchanges** - Indian Prime Minister has visited Singapore during ASEAN- India and RCEP and 13th East Asia Summit
 - In 2022, a 12 member Indian Parliamentary Delegation, led by Speaker (Lok Sabha) visited Singapore.
- **Judicial Cooperation** - Chief Justice of Singapore visited India to deliver the 1st Annual Lecture at the 1st Supreme Court of India Day Celebrations in 2023.
- **Economic Relationship** - Singapore is India's largest trade and investment partner in ASEAN and India's **6th largest** trading partner with 3.2% share of India's overall trade.
 - **Imports** - \$21.2 billion.
 - **Exports** - \$14.4 billion.
 - **Financial Relations** - Singapore has emerged as a key offshore logistics and financial hub for many Indian corporate/houses.
 - 9 Indian banks have operations in Singapore.
 - **Investment Partner**– Singapore is the largest source of foreign direct investments into India.
 - Cumulative FDI inflows from Singapore to India is about \$160 billion from April 2000 to March 2024, amounting to almost a quarter of total FDI inflows.
- **Defence Cooperation** - India and Singapore conduct Singapore-India Maritime Bilateral Exercise (SIMBEX) and Exercise Bold Kurukshetra annually.
- **S&T Cooperation** - ISRO has launched several Singaporean satellites.
- Singapore co-hosted inaugural ASEAN – India Women Scientists Conclave in April 2024.
- India and Singapore held an e-workshop in the area of digital health and medical technologies in July 2024.
- **Diaspora**- Ethnic Indians constitute about 9.1 % or around 3.5 lakhs of the resident population and there are about 1 lakh Indian migrant workers in Singapore.

Key Agreements	
2005	• Comprehensive Economic Cooperation Agreement(CECA)
1994	• Double Taxation Avoidance Agreement (DTAA)
1968	• Bilateral Air Services Agreement
2003	• Defence Cooperation Agreement
1994	• MOU on Foreign Office Consultations
2005	• Mutual Legal Assistance Treat

Cultural Relations	
Arts	A number of cultural societies like Temple of Fine Arts, Singapore Indian Fine Arts Society, Nrityalaya, Kalamandir, promote Indian classical dance and arts in Singapore.
Festival	Deepawali is regarded as the premier Indian cultural celebration, on par with the Chinese New Year and the Malay Hari Raya.
Cultural MoU	To promote inter-governmental cooperation in culture a MOU for Cooperation in the fields of Arts, Archives and Heritage was concluded in 1993.
Tamil	It is one of the four official languages of Singapore and India's first Thiruvalluvar Cultural Centre would be opened in Singapore.

Education

Many Indian educational institutions such as Global Indian International School, Delhi Public School, National Public School, Yuvah Bharati International School, DAV School have branches in Singapore.

What are the recent developments?

- **Strategic partnership** – Both nations reaffirmed the strength of the Comprehensive Strategic Partnership (CSP) that was established in 2015.
- **Financial integration** – In 2023, India's Unified Payments Interface (UPI) has been linked with Singapore's PayNow.
- It allows seamless cross border transactions and in deepening the digital between peoples of two nations.
- **Investments into India** – Singaporean companies have pledged an additional 60 billion USD in investments.
- **Offshore base for Indian companies** – Singapore has been a key hub for Indian companies seeking global expansion as it has favourable tax regime and robust financial infrastructure.
 - Currently, approximately 9,000 Indian companies operate in Singapore.
- **India Singapore Ministerial Roundtable (ISMR)** – It began in 2022 and has emerged as a vital platform for accelerating cooperation in advanced manufacturing, sustainability, healthcare, and digitalisation.
- The 2nd ISMR held in Singapore in 2024.
- **Recent Memorandums of Understanding (MoUs)** – Both nations have signed of four key MoUs covering semiconductors, digital technologies, skill development, and healthcare.
- India-Singapore Semiconductor Ecosystem Partnership was signed.
- **Cultural ties** – As both countries prepare to celebrate 60 years of diplomatic relations in 2025, contributions of Indian diaspora, including figures like Subhash Chandra Bose and the Azad Hind Fauj are acknowledged.

Singapore is the first nation with which India has begun this cross-border Person-to-Person (P2P) payment facility.

What are the impacts of India-Singapore Semiconductor Ecosystem Partnership?

- It has great geo-strategic and geo-economic importance.
- **Promotes self-reliance** – India needs to develop its own semiconductor ecosystem in the events of supply chain issues owing to China's aggression in Taiwan and South China Sea.
- **Enables industry development** - There is scope for collaboration with Singapore in talent development, and knowledge-sharing about best practices in managing semiconductor industrial parks.
- **Improves investments** – India's abundant land and competitive labour costs could encourage semiconductor companies in Singapore to look at the country for their expansion plans.
- **Challenges** - Singapore's semiconductor industry is limited to "mature-node chips" (process node technology of 28 nm or more), which are used in appliances, cars, and industrial equipment.
- It is not equipped to make high-end logic chips like the ones used in the AI sector (process nodes of 7 nm and smaller, requiring specialised production methods).

India's initiative in Semiconductor Industry

- **India Semiconductor Mission** – It was launched in 2021 with Rs 76,000 crore chip incentive scheme.
- Under this, the central government offered 50% of the plant's capital expenditure costs as subsidy.
- The Cabinet has so far approved five semiconductor units, including four assembly units, under the incentive scheme.
- **Semiconductor projects** – In 2024, the cabinet had approved four major projects totalling an investments of about Rs 1.26 lakh crore.
- **Industrial partnerships** – In 2024, the government partnered with the Tata Group and Taiwan's Powerchip Semiconductor Manufacturing Corporation (PSMC) to set up a semiconductor fabrication plant.

Quick Facts

India Singapore CECA

- **Formation** - It was concluded in June 2005.
- It was the first such agreement to be signed by India with any country.
- **Provisions** - It integrates agreements on trade in goods and services, investment protection, and economic cooperation in fields like education, intellectual property and science & technology.
- It also provides Mutual Recognition Agreements (MRAs) that eliminates duplicative testing and certification of products in sectors where there are mandatory technical requirements.
- **Implementation** – It is to be periodically reviewed by the two Governments.

1.7 Impact of President's Rule in Centre-State Relations

Why in news?

The recent spate of renewed violence in Manipur has once again triggered the discussion around Centre-State relations and the use of emergency provisions by the Centre.

What is India's federal structure of governance?

- India is a federation with governments at the Centre and the States.
- **Indian Constitution** – It has separate provisions with respect to legislative, executive and financial distribution of powers between Centre and State
 - **Legislative Relations** - Articles **245 to 255**
 - **Administrative Relations** - Articles **256 to 263**
 - **Financial Relation** - Articles **268 to 293**
- **Distribution of Power** - The **7th Schedule** to the Indian Constitution distributes the power between the Union and States.
 - **List I (Union List)** - 98 subjects (originally 97)
 - **List II (State List)** - 59 subjects (originally 66)
 - **List III (Concurrent List)** - 52 subjects (originally 47)
- Centre has exclusive control over Union List while State have exclusive control over State List except few instances.
- Both Centre and State can legislate on Concurrent List, but centre has overriding powers over state laws.
 - In India, it is the domain of the State governments to maintain law and order in their respective States.

What is President's Rule?

- **President's Rule** - **Article 356** allows for the imposition of the President's rule in the state.
 - President's Rule is also known as '**State Emergency**' or '**Constitutional Emergency**'.
- It can be proclaimed under two grounds
 - **Article 356** - When the government of a state cannot be carried on in accordance with the Constitutional provisions.
 - **Article 365** - When a state fails to comply with or to give effect to any direction from the Centre.
- **Duty of Central Government** - **Article 355** imposes a duty on the Centre to protect every State from external aggression and internal disturbance.
- It also specifies that the Centre should ensure that every State government operate according to the Constitution.
 - Article 355 was incorporated to check any arbitrary or unauthorised use of Article 356.
- **Approval of President's Rule** - A proclamation imposing President's Rule must be approved by both the Houses of Parliament **within 2 months** from the date of its issue.
- **Duration** - If approved by both the Houses of Parliament, the President's Rule continues for **6 months**.

The emergency provisions are provided in Part XVIII of the Constitution where Articles 355 and 356 deal primarily with the affairs of government in a State.

While in the U.S. and Australia, federal government functions also involve protecting States, their constitutions do not contain provisions for removing State governments.

- It can be extended for a **maximum period of 3 years** with the approval of the Parliament, every 6 months.
- **Condition on Extension** - The 44th Amendment Act of 1978 introduced conditions to extend the proclamation of President's Rule beyond one year.
 - A proclamation of National Emergency should be in operation in the whole of India or in part. (Or)
 - Election Commission must certify that the general elections to the legislative assembly of the concerned state cannot be held.
- **History of President's Rule** - Since 1950, the President's Rule has been imposed on more than 125 occasions.
 - For the first time, the President's Rule was imposed in Punjab in 1951.

What are its impacts on Centre-State Relations?

- **Impacts on Executive Power**– President can take up the functions of the state government.
- President dismisses the state council of ministers headed by the chief minister.
- The state governor, on behalf of the President, carries on the state administration.
- **Impact on Legislative Power** - President either suspends or dissolves the state legislative assembly.
- The Parliament passes the state legislative bills and the state budget.
- The law made by the Parliament continues to be operative even after the President's Rule.
- **Issues** - Article 356 was misused on several occasions removing elected governments that enjoyed majority in the States.
- Their invocation varied from loss in Lok Sabha elections to deterioration of law and order in the States.

How court ruling have shaped president's rule in India?

Cases	Judgements
State of Rajasthan Vs Union of India (1977)	<ul style="list-style-type: none"> • <u>Courts can strike down</u> President's rule if it was based on irrelevant or mala fide considerations. • <u>President's satisfaction is a prerequisite</u> for exercising the powers under Article 356.
S R Bommai case (1994)	<ul style="list-style-type: none"> • Article 356 should be imposed <u>only in the event of a breakdown of constitutional machinery</u>. • <u>Cannot be invoked</u> for an ordinary breakdown of <u>law and order</u>. • Should not be misused for political reasons. • Proclamation is <u>subject to judicial review</u>.
H.S.Jain Vs Union of India (1997)	<ul style="list-style-type: none"> • It broadened the interpretation of Article 355 <u>giving the Union more flexibility</u> to intervene in state affairs.
Naga People's Movement of Human Rights Vs Union of India (1998)	<ul style="list-style-type: none"> • The deployment of armed forces in aid of civil power is permitted for a temporary period, until normalcy is restored
Sarbananda sonowal vs union of india (2005)	<ul style="list-style-type: none"> • Court struck down the Illegal Migrants (Determination by Tribunals) Act (IMDT Act) 1983 as it violated Article 14 & 355. • It also failed to address the problem of illegal immigration in Assam.

What lies ahead?

- Dr. Ambedkar in the constituent Assembly wished that Articles 355 and 356 would never be called into operation and would remain a dead letter.
- It shall be invoked as a last resort as recommended by various committees as mentioned below

Committee	Recommendations
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1st ARC 1967	<ul style="list-style-type: none"> It shall be used as a last resort if state fails to follow the constitutional machinery.
Sarkaria Commission (1987)	<ul style="list-style-type: none"> All possibilities of forming an alternative government should be explored before imposing President's Rule. Article 356 should be used only as a last resort, when all other options have failed. Before invoking Article 356, the center should <u>issue a warning to the state</u> in specific terms. President's proclamation <u>should include the reasons</u> why the state cannot run normally. President should only be able to dissolve the state legislature after getting parliamentary approval.
National Commission to Review the Working of the Constitution (NCRWC) (2002)	<ul style="list-style-type: none"> President's Rule under Article 356 should be <u>used sparingly</u> and only in extreme situations. Grounds for invoking President's Rule should be clearly defined and more stringent. <u>Courts should have greater power to review</u> the President's decision to impose President's Rule. <u>Limiting the duration of President's Rule</u>, to ensure that it is not used as a tool to indefinitely suspend a state government.
Punchhi Commission (2007)	<ul style="list-style-type: none"> Localize areas, a district or parts of a district be brought under the President's rule instead of the whole State. The time period of an emergency should be <u>at most three months</u>. Specific guidelines on the chief ministers' appointment to limit the discretionary powers of the governor.

Quick Facts

Constitutional Provisions on Emergency

- Emergency provisions are contained in Part XVIII of the Constitution from Articles 352 to 360.
- Article 352** - Proclamation of Emergency
- Article 353**- Effect of Proclamation of Emergency
- Article 354**- Distribution of revenues while a Proclamation of Emergency is in operation
- Article 355**- Duty of the Union to protect states against external aggression and internal disturbance
- Article 356**- Provisions in case of failure of constitutional machinery in states
- Article 357**- Exercise of legislative powers under proclamation issued under Article 356
- Article 358**- Suspension of provisions of Article 19
- Article 359**- Suspension of the enforcement of the rights conferred by Part III during Emergencies
- Article 360**-Provisions as to Financial Emergency

1.8 National Quantum Mission

Why in News?

India's National Quantum Mission launched last year seeks to advance research in Quantum Technologies and promote indigenous research.

What is Quantum Computing?

- **Quantum computing** – It is the computing technology that utilizes quantum mechanics to solve complex problems faster than on classical computers.
- It harnesses the unique behavior of quantum physics such as superposition, entanglement, and quantum interference and apply it to computing.
- **Superposition** – It is the ability of a quantum system to be in multiple states at the same time until it is measured.
- **Entanglement** - It is a phenomenon that explains how two subatomic particles get linked to each other irrespective of distance such that a level of change in one particle gets reflected on the other.
- **Interference** - It is a wavelike superposition of states of subatomic particles that affect the probabilities of states of these particles when measured.
- While entanglement is a phenomenon between two particles, interference is an effect of many particles surrounding each other.
- **Qubit** – It is the basic unit of information in quantum computing that plays a similar role in quantum computing as bits play in classical computing, but they behave very differently.
- Classical bits are binary and can hold only a position of 0 or 1, but qubits can hold a superposition of all possible states.
- Signals can be sent to the qubits using a variety of methods, including microwaves, laser, and voltage.
- **Quantum Computer Components** – A quantum computer has three primary parts
 - An area that houses the qubits
 - A method for transferring signals to the qubits
 - A classical computer to run a program and send instructions

Quantum mechanics is the science dealing with the behaviour of matter and light on the atomic and subatomic scale.

To know more about Quantum technologies, click [here](#).

What is National Quantum Mission (NQM)?

- **Objectives**
 - To seed, nurture and scale up scientific and industrial R&D.
 - To create a vibrant & innovative ecosystem in Quantum Technology (QT).
 - To developing intermediate-scale quantum computers with 50-1000 physical qubits in 8 years.
 - To create **Satellite-based secure quantum communications** between ground stations over a range of 2000 km within India.
 - To develop long-distance secure quantum communications with other countries.
 - To create inter-city quantum key distribution over 2000 km.
 - To develop multi-node Quantum networks with quantum memories.
- **Launched in** - 2023
- **Mission Period** - **2023-24 to 2030-31**
- **Nodal Ministry** - Ministry of Science and Technology
- **Four thematic hubs (T-hub)** – They will be established in top academic and National R&D institutes in the domains of
 - Quantum Computing
 - Quantum Communication
 - Quantum Sensing & Metrology
 - Quantum Materials & Devices

Quantum Computer Projects in India

- The Tata Institute of Fundamental Research (TIFR), Mumbai, has developed a 3-qubit quantum computer based on superconducting qubits, and is preparing to develop a computer with 7 qubits in collaboration with DRDO and TCS.
- IISER Pune's I-HUB Quantum Technology Foundation is working on a 20+ qubit quantum computer based on ion traps and another computer based on neutral atoms along with IIT Roorkee and IIT Guwahati.
- IIT Bombay and IISER Thiruvananthapuram are working on spin qubits based on semiconductors, while IISc Bangalore is also working on superconducting qubits.

How the mission is aligned with other initiatives?

- It will provide a huge boost to National priorities like Digital India, Make in India, Skill India and Stand-up India, Start-up India, Self-reliant India and Sustainable Development Goals (SDG).
- **Digital India** – It supports the aims and ambitions of Digital India scheme by making effective computing and secure communication through advancements in the field of quantum technology.
- **Make in India** – It creates a niche for indigenous research and development (R&D), manufacturing, and investments for building quantum devices and related products.
- **Skill India** – It encourages skill development in the field of quantum technologies through training and education.
- **Stand-up India, Start-up India**- It stimulates innovation and entrepreneurship under its various verticals.
- **Self-reliant India** - It aims at advancing quantum technologies within the country, promoting indigenous research to minimise reliance on foreign resources.
- **Sustainable Development Goals (SDGs)** - Through NQM, global challenges related to climate (SDG 13), energy (SDG 7), and healthcare (SDG 3) can be addressed.

What are the benefits of NQM in other sectors?

- The progress made in the field of the NQM can benefit various sectors such as communication, health, energy and finance in different ways.
- **Secures communication** - It enables secured encryption along with high speeds of data transfer in satellite communication.
- **Improvise health sectors** - It would accelerate drug discovery, genomic research and precision in medical diagnostics.
- **Support financial sector** – It facilitates complex financial modelling and risk analysis through various optimization algorithms.
- Quantum cryptography enhances the security of financial transactions.
- **Increase efficiency of energy sector** – It optimizes the energy grid
- **Promote explorations** – It can lead to the discovery of new materials with unique properties such as superconductors, and advanced batteries.

Quantum simulations simulate the behaviour of materials at the atomic level.

What are the challenges in achieving NQM Objectives?

- India is lagging behind countries like the US and China in terms of investment, publishing papers on quantum-related science, and registering patents.
- **Insufficient investment** - India has allocated 6,000 crores (\$0.75 billion) for the National Quantum Mission whereas China and US allocate \$15.3 billion and \$3.75 billion respectively.
- **Inadequate research** - India is 10th in terms of papers published related to Quantum Technologies.
- **Low patent creation** - Indian researchers had acquired only 339 such patents between 2015 and 2020 and ranks 9th by the number of patents obtained in Quantum Technologies.
- **Lack of industry-academia linkage** - Collaborations between academic institutions, research organisations and industries are not enough to get the required momentum in research.
- **Fewer quantum manufacturing** - In India, only about 3 per cent of deep tech start-ups are involved in the manufacturing or development of materials related to Quantum Technologies.
- **Deficient skilled workforce** - Sufficient pool of scientists, engineers, and professionals who have specialised in quantum technology is not available.

What lies ahead?

- Research in this area would require building state-of-the-art laboratories, the purchase of advanced equipment, and long-term support.
- Public and private sectors can come forward to fund research infrastructure and facilities through comprehensive investment models
- A collaborative research and development ecosystem would help integrate efforts across academia, industry, and government.
- Educational outreach initiatives to increase public awareness and industry-specific conferences to engage business leaders and investors would aid such efforts.

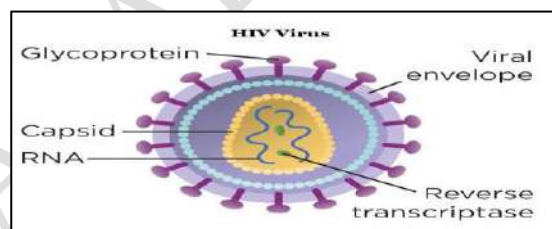
1.9 AIDS Eradication

Why in News?

New HIV cases down in India by 44% since 2010.

What is AIDS?

- **Acquired immunodeficiency syndrome (AIDS)** – It is a chronic condition caused by the human immunodeficiency virus (HIV) and the final and most serious stage of an HIV infection.
- First cases of HIV AIDS were detected in the 1980s.
- **HIV Virus** - It is a **lentivirus**, which is a sub-classification of the **retrovirus**.
- It attacks the body's immune system, particularly white blood cells called CD4 cells.
- **Transmission** - Sexual contact, transfer of bodily fluids such as through infected needles, blood transfusions and from mother to child at birth.
- **High Risk Populations** – Persons who inject drugs have a 35 times greater risk of acquiring HIV.
- Men who have sex with men (MSM) have a 28 times greater risk.
- Transwomen have 14 times higher risk than adult women (aged 15–49).
- Female sex workers are at 30 times greater risk.
- **Prevention of transmission** - It can be prevented by use of condoms during sex, using sterilised needles and not reusing needles and testing bloods before transfer.
- **HIV Treatments** – There is no vaccine for AIDS and no direct drug to cure AIDS but can be treated to control the associated illness.
- **Pre-exposure prophylaxis (PrEP)** – It is a pill that has 2 anti-HIV medicines taken daily to prevent HIV for HIV-negative people.
 - PrEP Drugs - Truvada, Descovy, and Apretude
- It is taken before you think you might be exposed to HIV.
- **PEP** - This medicine prevents HIV after potential exposure.
- It is taken within 72 hours after exposure to HIV (e.g. after rape) for 28 days to prevent HIV.
- **Antiretroviral Therapy (ART)** - It is a 3-medicine treatment for HIV-positive people that reduces the levels of HIV in a person's body.
- It helps the body stay strong and helps it fight off infections and other illnesses.
- **Protease inhibitors** - It is a new class of antiretroviral drugs introduced in 1995 and they prevent a virus from making more copies of itself.
- **Therapy** - Highly Active Antiretroviral Therapy & cocktail therapy combining three or more anti-retroviral drugs, became available starting in 1996.
- **Recent developments in Treatment**



CD4 cells also known as CD4 T lymphocytes or "helper T cells" help fight infection by triggering immune system to destroy viruses, bacteria, and other germs.

The first antiretroviral drug, AZT (zidovudine), was approved by the US Food and Drug Administration (US FDA) in March 1987.

- New PrEP Drugs – Lenacapavir and Descovy F/TAF
- Stem Cell Treatment – Recently a HIV patient got cured of AIDS following a stem cell transplant.

Status of AIDS

- **Global Status** - As of 2022, 39 million people globally were living with HIV and the new infection amounts to 1.3 million (Decreased by 39%).
- **India Status** - The number of People Living with HIV (PLHIV) in India is estimated at around 24 lakhs that is 6.3% of global HIV population (around 10% two decades ago).
- The new infections were around 66,400 (Decreased by 44%) and adult HIV prevalence were 0.2%.
- **High prevalent region** - The north-east region States have the highest adult HIV prevalence (2.70% in Mizoram, 1.36% in Nagaland and 1.05% in Manipur).
- It is followed by southern States (0.67% in Andhra Pradesh, 0.47% in Telangana and 0.46% in Karnataka).

How India has progressed in controlling AIDS?

- **India's Progress** - As of the end of 2023
 - 82% knew their HIV status
 - 72% were on ART
 - 68% were virally suppressed.
- AIDS-related deaths have been reduced by 69% since the peak in 2004.
- **Prevention and Control** - National AIDS Control Programme (NACP) was launched in 1992 for prevention and control of HIV/AIDS in India and implemented by National AIDS Control Organisation.
- 5th phase of the National AIDS and STD Control Programme (2021-2026) seeks to reduce
 - Annual new HIV infections by 80%
 - AIDS-related mortalities by 80%
 - Eliminate vertical transmission of HIV and syphilis— by 2025.
- **Diagnosis** - Comprehensive HIV and syphilis testing to all pregnant women
 - More than 30 million free HIV tests being conducted annually.
 - More than 1.7 million people are receiving free ART through public healthcare systems.
- **Treatment** - **Free ART** was launched for PLHIV on April 1, 2004.
- **Comorbidities management** - Efforts to tackle tuberculosis, viral hepatitis, and non-communicable diseases, is helping address co-morbidities faced by people living with HIV.
- **Awareness Creation** - Youth-targeted initiatives like Red Ribbon Clubs in educational institutions.
- Mass-awareness activities such as the annual RED RUN Marathon.
- Indian Health Service observes National HIV Testing Day on June 27, to highlight the importance of testing for and detecting HIV infection.
- **De stigmatization** - HIV and AIDS (Prevention and Control) Act 2017 provides for ombudsmen to handle grievances and promote HIV prevention policies.
- **Universal Coverage** - National Strategic Plan on HIV/AIDS and Sexually Transmitted Infection (STI) is a seven-year programme (2017-24) to attain universal coverage of HIV prevention, treatment.

What are the global initiatives against AIDS?

- **UNAIDS** - Joint United Nations Programme on HIV/AIDS was created in 1996 co-sponsored by 11 United Nations agencies.
- **UN General Assembly's Millennium Summit 2000** – It issued a declaration to stop and reverse the spread of HIV.
 - In 2015, countries achieved the targets envisaged under Millennium Development Goal 6A – to halt and reverse the spread of HIV/AIDS.

- Target 6B of MDG -It sought to achieve universal access to treatment for HIV/AIDS for all those who need it by 2010.
- **Global Fund to Fight AIDS, Tuberculosis and Malaria** - It promotes universal access to HIV prevention, treatment and care in 2002.
- **WHO 2024 AIDS Clinical Module** - The module integrates clinical service delivery guidance for all 3 WHO recommended PrEP products that is oral PrEP, the dipivefrine vaginal ring and long acting injectable cabotegravir.
- **Stigma Index** - The People living with HIV Stigma Index is a tool designed to gather evidence about how discrimination and stigma affects the lives of those living with HIV.
- It was developed by the Global Network of People Living with HIV (GNP+), ICW, UNAIDS and International Planned Parenthood Foundation (IPPF).
- **SDG Target** - United Nations' Sustainable Development Goal 3 aims at ending HIV/AIDS as a public health threat by 2030.
- **Let Communities Lead** - In 2023, UNAIDS released this report, highlighting community participation in efforts to end the AIDS epidemic.
- **UNAIDS 10-10-10 target** - Pathways to Achieving the Global 10-10-10 HIV Targets was released by UNDP
 - Less than 10% of countries would have punitive legal environments that deny or limit access to services.
 - Less than 10% of people living with HIV would experience stigma and discrimination
 - Less than 10% of women, girls people living with HIV would experience gender inequality and violence
- **95-95-95 Target by 2025**
 - 95% of all people living with HIV know their HIV status.
 - 95% of all people diagnosed with HIV infection receive sustained antiretroviral therapy (ART).
 - 95% of all people receiving antiretroviral therapy achieve viral suppression by 2025.
- **UNAIDS New Sustainability approach** - In 2024, UNAIDS proposed a new approach to ensure a sustained HIV response beyond 2030.
- **SCALE Initiative** -It is a UNDP-led partnership to accelerate the removal of structural barriers to HIV services and drive progress on the historic 10-10-10 HIV targets through population-led efforts.
- **AIDS Conference** - 25th International AIDS Conference is held in 2024 in Munich bringing together scientists, policy makers, healthcare professionals, people living with HIV, funders, media and communities.

What are the challenges in AIDS control?

- **Lack of awareness** - More than 40% of people living with HIV still do not know they are infected.
- **Difficult medication** - Daily PrEP regimen is challenging to maintain due to social and structural reasons.
- **Costly Treatments** - Costs, of the antiretroviral therapies remained prohibitively high about \$10,000 a year.
- **Stigma** – Self stigmatization and social stigmatization prevents the participation of PLHIV from getting treatment.
- **Exclusion** - Feelings of shame and guilt were often based upon experiences of social exclusion.
- **Drug resistance** – At least 5% of people on ART were resistant to at least 1 antiretroviral drug.
- **Drug shortage** - Some people living with HIV have had their regimen changed due to the unavailability of certain ARVs.

What lies ahead?

- Use Stigma Index to understand the level of stigmatization prevalent in the society and take appropriate measures to address it.
- Provide psychological counselling and therapy, and psychiatric intervention to support persons living with HIV.
- Create treatment programmes to reach people who may be reluctant to come forward.
- Make community leadership central to the formulation, budgeting, implementation, monitoring and evaluation of all plans, policies and programmes that will affect communities.

- Fully and sustainably fund communities' leadership roles so that programmes can be scaled up, and the people implementing them can be properly supported and remunerated.

G.S PAPER I

2. HISTORY

2.1 100 years of Discovery of Harappan Civilization

Why in News?

September 20, 2024, marks the 100th anniversary of the announcement regarding the discovery of the Harappan Civilisation.

What is Harappan Civilisation?

- Civilization** - It is a **Bronze Age society** that existed along the river Indus, thus referred to as the Indus Valley civilization (IVC).
- It is also called Harappan civilization, named after *Harappa* which was the **first site unearthed** in the region.
 - Harappa is an IVC site in located in present-day Pakistan.
- Discovery** – In 1921, John Marshall who was then the Director General of the Archaeological Survey of India authorized an Article called “**New Discoveries of an Unknown Prehistoric Past**”.
- He termed his discovery as “civilization of the Indus Valley.”
- This civilization thrived near the Indus and Saraswati rivers.

Daya Ram Sahni (Year 1921)	Rakhal Das Banerji (1922)
<ul style="list-style-type: none"> Excavated - Harappa Site. Discovered - Uncovering seals, painted pottery, and beads. 	<ul style="list-style-type: none"> Excavated - Mohenjo-daro Discovered - Seals, pottery, copper artifacts, and crucibles

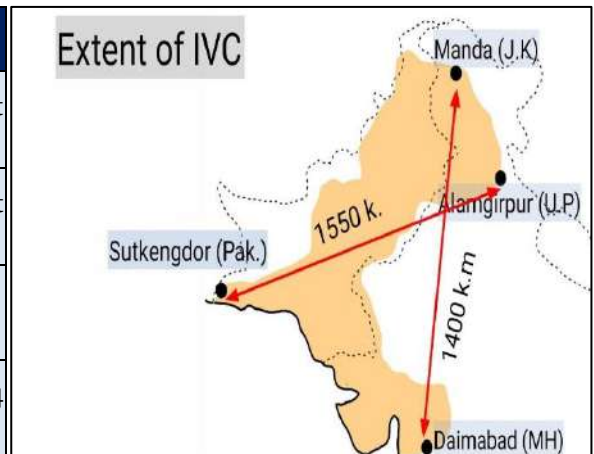
What are its geographical extension?

Three Phases of IVC		
<p>Early Phase (3200 BCE to 2600 BCE)</p> <ul style="list-style-type: none"> It was mainly rural. Here, the population shifted from the uplands of Baluchistan to the floodplains of the Indus Valley. 	<p>Mature Phase (2600 BCE to 1900 BCE)</p> <ul style="list-style-type: none"> It is marked by more human settlements & Town planning. 	<p>Later Phase (1900 BCE to 1500 BCE)</p> <ul style="list-style-type: none"> It was a time of gradual decline for the civilization. It saw the breakdown of urban centers and the establishment of rural networks.

- Geographical area** – It spans about 1.5 million sq.km.

- **Coverage** – It is spread across North West India, Pakistan, and Afghanistan.

Boundaries	Extension
Western boundary	<ul style="list-style-type: none"> • Up to the coastline of South Baluchistan at Suktagedor.
Eastern boundary	<ul style="list-style-type: none"> • Up to Alamgirpur in Uttar Pradesh (District Meerut).
Northern Boundary	<ul style="list-style-type: none"> • It stretched to Manda in Jammu & Kashmir
South Boundary	<ul style="list-style-type: none"> • Diamabad in Maharashtra that revealed 4 Bronze figurines along the Pravara River.



- **Extension In India** –
 - **Gujarat** – Lothal and Dholavira
 - **Haryana** – Rakhigarhi
 - **Jammu and Kashmir** - Manda
 - **Maharashtra** - Daimabad
 - **Rajasthan** - Kalibangan
 - **Uttar Pradesh** - Alamgirpur
- The Southernmost extension is Daimabad on Godavari river basin in Maharashtra.
- **Total sites** – Around 2,000 within this civilization's expanse.
 - **Five largest sites** – Mohenjo-daro, Harappa, Ganweriwala (all in Pakistan), Rakhigarhi, and Dholavira (both in India).
- **Heart of the civilization** - It was located in Sind and Punjab in unpartitioned India, from which it radiated in all directions.

What are its features?

- **Economy** – They engaged in agriculture, animal husbandry, and also involved in trade.
- **Society** – It was matriarchal in nature as a large number of **terracotta female figurines** have been found from various sites that represent the worship of the Great Mother Goddess.
- **Religion** – They worshipped animals, human figure and trees.
- **Craft** – Development of epigraphy, ceramics, pottery, bead making and bronze & copper crafts
- Detailed lapidary craftsmanship, particularly in micro-drilling long carnelian beads with chemically stained designs were observed.
- **Seals** - Intricately carved stamp seals made of steatite, engraved with life like human and animal motifs along with text or icons were found.
- **Town Planning** – At its Peak, it was a "technological powerhouse," known for town planning, water management, construction of reservoirs, stadiums, underground drainage systems, fortification walls & boat building.
- **Standardized measures** – It includes cubic weights crafted from polished chert using binary and decimal systems.
- Widespread use of standardized burnt bricks with a 1:2:4 ratio for bonding.
- **Science & Technology** – They had specialized metallurgists, hydrologists, mathematicians & astronomers.

Remarkable similarities was seen between the artifacts from Harappa and Mohenjo-daro, despite their 640 km separation.

How IVC discovery bridges historical gaps in India?

- **Settled life in India** – Historians previously believed that settled life in the region began only around the sixth century BCE, creating a historical void in South Asia.
- **Historical gap** – India transitioned abruptly from the Stone Age to the era of Buddhist stupas.

- **Continuity of settled life** - Discovery of the *Harappan civilisation filled this gap* and significantly *extended the timeline of settled life in* the region by over 3,000 years.
- It introduced another ancient civilization in Asia, alongside those in Egypt and Mesopotamia.
- **Trade links** – It *unveiled the Harappan civilization's maritime links* with West Asia dating back to 3000 BCE alongside those in Egypt and Mesopotamia

3. GEOGRAPHY

3.1 Impact of Arctic Sea ice on Indian Monsoon

Why in news?

New research reveals that changing Arctic Sea level has significant impact on monsoon patterns.

What is the Arctic Sea ice?

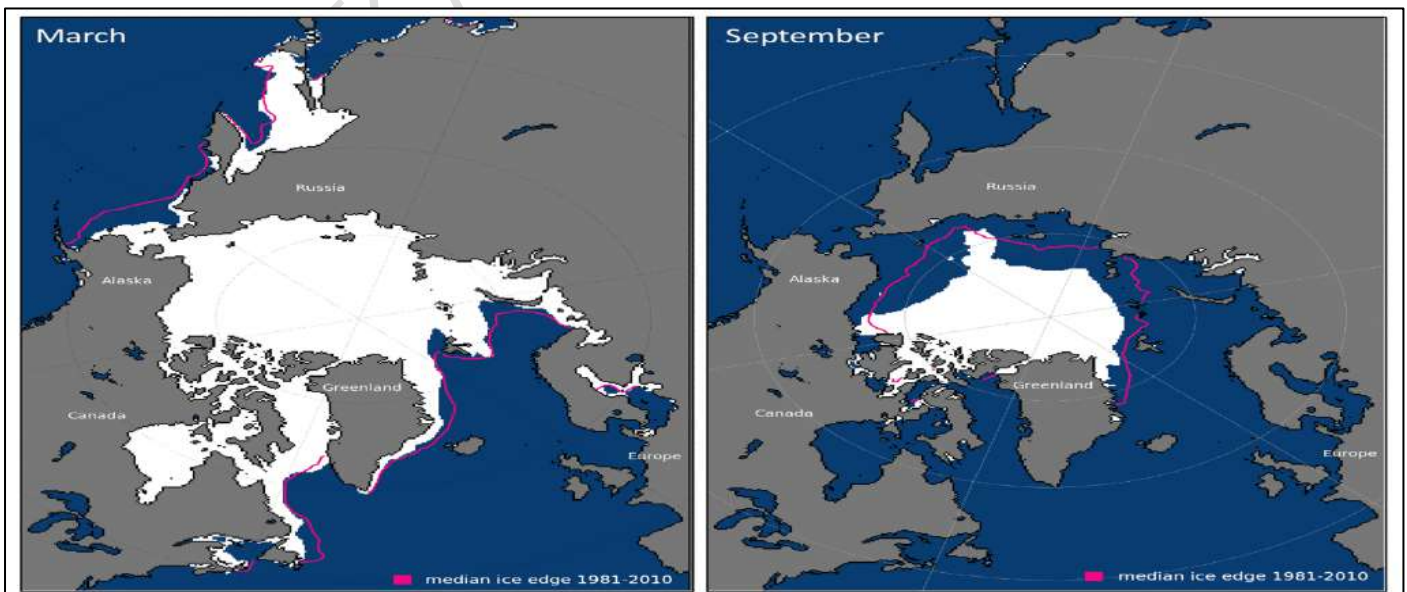
- **Sea ice** - It is sea water that freezes from the ocean surface down to several feet below, is an integral part of the Arctic Ocean.
- **Importance of sea ice** - Sea ice helps in
 - Regulating Earth's climate
 - Influencing global weather patterns
 - Affecting ocean circulations
- **The Arctic ice** – It is the sea ice cover of the Arctic Ocean and its vicinity.
 - **During the dark winter months** – Sea ice essentially covers the entire Arctic Ocean
 - **In summer** – Some of this ice melts because of warmer temperatures and long hours of sunlight.

Arctic Circle is the line of latitude around Earth, at approximately 66°30' N.

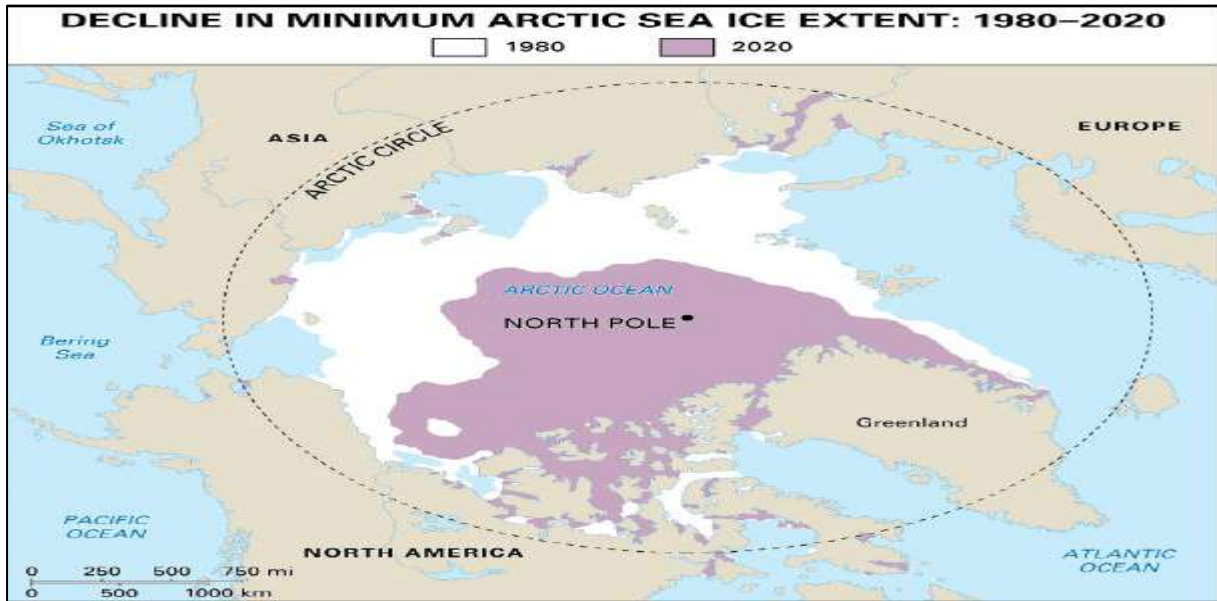


What is Arctic sea ice change?

- **Arctic Minimum** - Arctic Sea ice reaches its minimum each September and reaches the maximum extent in March.
- **Declining Arctic minimum** – The *Arctic is warming faster* than anywhere else on the planet.
- As a result, sea ice in the Arctic Ocean is decreasing.



- **Shrinking September Arctic Sea ice** – It is now decking at a *rate of 12.2% per decade*, compared to its average extent during the period from 1981 to 2010.



- **Impact on Monsoon** - Arctic Sea ice levels affect atmospheric circulations that in turn influence the Indian Summer Monsoon Rainfall (ISMR).
- Due to the climate change, sea ice concentration (SIC) in the central Arctic Sea is reducing, which is affecting ISMR.
- **Less central Arctic sea ice** - It leads to
 - Lower rain in western and peninsular India
 - More rain in central and northern India.
- Lower sea ice levels in the upper latitudes, particularly in the Barents-Kara Sea region delay the monsoon's onset and render it more unpredictable.
 - **Barents-Kara Sea region** encompassing the Hudson Bay, the Gulf of St. Lawrence and the Sea of Okhotsk.

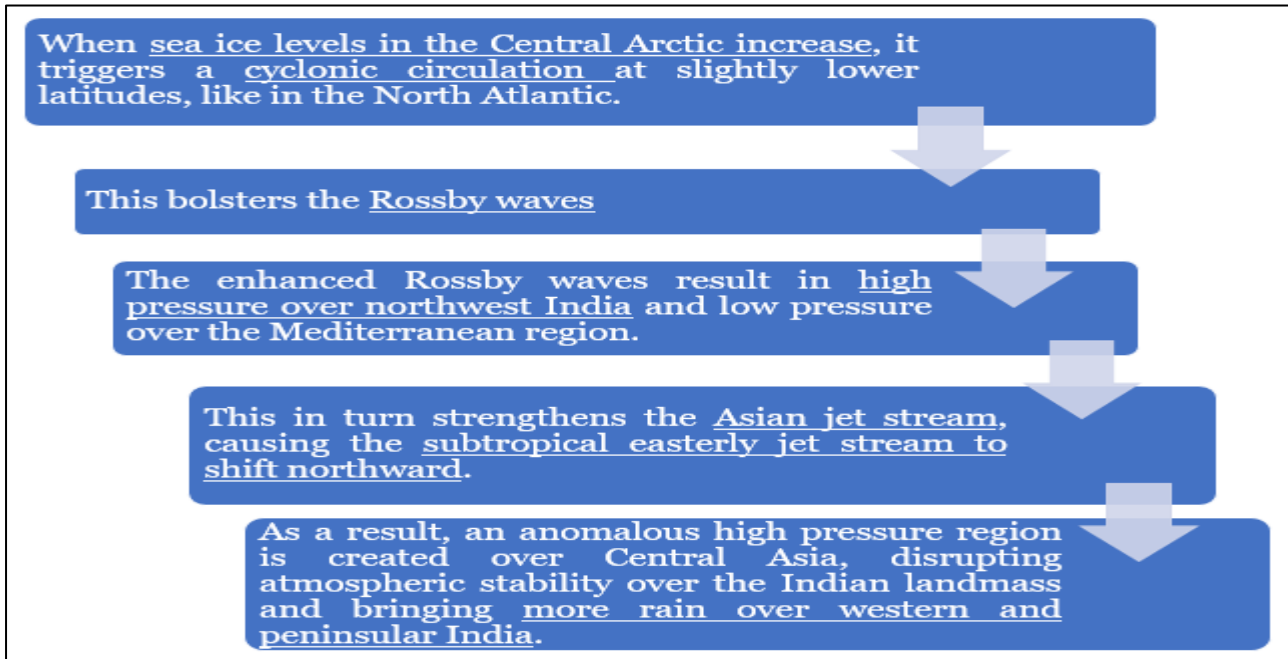
What is the Indian Summer Monsoon Rainfall (ISMR)?

- **Occurrences** – It occurs over the Indian subcontinent from July month.
- **Determining factors** - The surface temperatures of the Indian, the Atlantic, and the Pacific Oceans affect the ISMR.
- **Pressure gradient** - In summer months, sunlight warms the Central Asian and Indian landmass more and faster than the surrounding ocean.
- This creates a low pressure band at the Tropic of Cancer called the **intertropical convergence zone**.
- **Wind movement** - Trade winds blowing from the southeast are subsequently deflected towards the Indian landmass due to the Coriolis force and the low pressure after they cross the equator.
- **Rainfall** - As they blow over the Arabian Sea, the winds pick up moisture and deposit that as rain over India.
- **Branches** - Over the landmass itself, this southwest monsoon splits into two.
 - **Arabian Sea arm** - It brings rain to the west coast.
 - **Bay of Bengal arm** – It brings rain to India's eastern and northeastern parts.
- These two arms finally converge over Punjab and Himachal Pradesh as the Arabian Sea arm moves inward and the Bay of Bengal arm moves along the Himalaya.

The circum-global teleconnection (CGT), a large-scale atmospheric wave flowing at the mid-latitudes, seemed to significantly influence the monsoon as well.

To know more about Monsoon, Click [here](#)

How increase in Central Arctic sea ice influence ISMR?



- **Cyclones formations** – Higher SIC triggers a *cyclonic circulation at lower latitudes*, the heat transferred from the ocean to the atmosphere which in turn strengthens the Rossby waves.
- This enhanced Rossby waves creates
 - **High Pressure over** – Northwestern India
 - **Low pressure over** – Mediterranean region
- **Strengthening of Asian Jet Stream** – It is a narrow band over the Caspian Sea which causes the subtropical easterly jet stream to shift northwards.
- It results in high pressure region over Central Asia disrupting atmospheric stability over Indian landmass.
- **Rainfall in India** – As a result, *Western and Peninsular India receives more rainfall.*

Rossby waves are fast-flowing streams of air high in the atmosphere created by the earth's rotation and differences in temperature and weather systems that move west to east.

The Subtropical Easterly Jet Stream (STEJ) is a high-altitude wind pattern that flows from east to west over the Indian subcontinent during the summer months.

How lower Arctic sea ice impacts ISMR?

- High pressure over China – Low sea ice over the Barents-Kara Sea region *triggers a series of air currents* that produce an anomalous *high pressure over southwest China*.
- This correlates with a **positive Arctic Oscillation**, a high pressure over the northern Atlantic and Pacific oceans along with a weakening of the CGT, which connects weather events in different parts of the world.
- **Anticyclones formation** – As sea ice levels decrease in the region, heat rises from the Barents-Kara sea, creating an anticyclonic circulation (calm, clear skies) over northwest Europe.
- This disturbs the upper atmospheric region over subtropical Asia and India.
- **Rainfall in India** - This instability, coupled with high surface temperature of the Arabian Sea and the moisture picked up from the surrounding water bodies promotes **high rainfall over northeastern India**.
- It leaves the central and northwest regions of the country without much rainfall.

3.2 Climate Change and Extreme Rainfall

Why in News?

Severe flooding events have been occurring across the globe in Europe, Arab and American regions.

What are the extreme rainfall events across globe?

- **Europe** - Regions of Austria, the Czech Republic, Poland and Romania have been hit by days of heavy rainfall.

- Heavy or record-breaking precipitation triggered floods in Italy, Norway, Sweden and Slovenia.
- **Arab** - United Arab Emirates and Oman experienced the heaviest rainfall since records began.
- **Africa** - Deluges in Kenya claimed numerous lives and triggered landslides.
- **South America** - Brazil, floods damaged an area equivalent in size to the UK and displaced over half a million people.

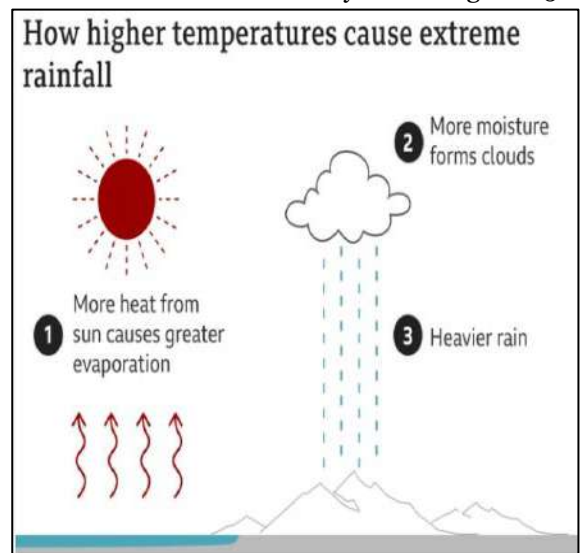
What factors causes extreme rainfall?

- Winds, high tides, river, groundwater and flash flooding are all linked to heavy rainfall.
- **Water cycle** - The water cycle is a continuous process that involves the evaporation of water from the Earth's surface, the condensation of water vapor into clouds, and the subsequent fall of rain.
- **Air pressure** - Low-pressure systems have less air on top of them, which causes the air to rise into the clouds and condense into rain.
- **Air Temperature** - Air's capacity to hold moisture **rises by 7%** with every rise of 1 degree Celsius.
- **Air Mass** - When cold air enters an area, it forces warm air into the clouds, causing water vapor to condense into rain.
- **Geological barriers** - Mountains can alter rainfall patterns, with the windward side receiving more rain than the leeward side.
- **Human activity** - Human-produced carbon dioxide emissions and climate change have been linked to increased day-to-day rainfall fluctuations.

How is climate change impacting global rainfall?

- Climate change is impacting the **frequency** of heavy downpours during storms and sudden outbursts through its influence on complex atmospheric and weather patterns.
- **Green House Gases** - Greenhouse gases released by burning fossil fuels into the atmosphere act like a blanket on the earth, trapping heat and causing temperatures to rise.
- **Global Warming** - Since the pre-industrial era, global air temperatures have increased by around 1.3 degrees Celsius.
- Rising global temperatures is making rainfall more frequent and severe across most parts of the world.
- This leads to a more rapid evaporation of water on land and at sea, thus favouring conditions for heavy rainfall.
- **Impact on Climate patterns** - Climate change is likely to increase the warming effects of El Niño and decrease the cooling effects of La Niña.
- **More Rainfall than snow** - Temperature rises also make more precipitation fall as rain instead of snow which can make high altitude regions vulnerable to flooding and landslides.
- In snowy, high-elevation parts of the Northern Hemisphere, rainfall extremes increased by an average of 15% per 1 degree Celsius of warming.
- **Increased frequency** - Heavy precipitation that would have been a once in a 10-year rainfall event will occur 1.5 times every decade.
- On average, 1 in 4 record rainfall extremes in the last decade can be attributed to climate change.
- **Increased rainfall amount** – Last year the average rainfall was 20% higher than the average for 1991-2020.
- Rainfall is over 10% wetter and Europe had around 7% rainier than normal, with most of the continent experiencing wetter-than-average conditions.
- **Future Projections** - At 2 degrees Celsius of warming above pre-industrial levels, what would have been a once-every-10-year rainfall event will occur 1.7 times per decade and be 14% wetter.

El Niño and La Niña are climate patterns in the Pacific Ocean that can affect weather around the world and these are part of the El Niño-Southern Oscillation (ENSO) cycle.



- At 4 degrees Celsius, heavy rains that used to hit once a decade could hit almost three times more often and release 30% more rain.

What are the impacts of extreme floods?

- Flooding, among the most widespread natural disasters, affects people's lives, critical infrastructure, wildlife and fertile soil and causes economic damage.
- **Loss of life** - Since 2000, the proportion of people exposed to floods is estimated to have increased by 24%.
- About 1.8 billion people, just under a quarter of the global population, are directly exposed to one-in-100-year floods.
- **Damage to property** - Floodwaters can cause structural damage to homes, and carry away vehicles and other property.
- **Damage to infrastructure** - Floodwaters can damage bridges and roadways, making travel difficult.
- **Displacement** - Floods can displace people from their homes.
- **Health effects** - Floods can cause mental health problems, undernutrition, and pollute drinking water systems causing waterborne diseases.
- **Damage to cultural heritage** - Floods can damage monuments, structures, building contents, works of art, archive records, and manuscripts.
- **Landslides** - Floods can cause landslides and make soil and bank erosion, siltation.

An estimated 89% of people exposed to high flood risk live in low- and middle-income countries and Most live in South and East Asia, with 395 million exposed people in China and 390 million in India.

What are the mitigation measures?

- **Structural measures** - Building flood barriers, levees, seawalls, and floodgates.
- Flood proofing is another strategy that involves elevating critical equipment or placing it in waterproof containers.
- **Non-structural measures** - Removing people and property from areas at risk, such as through zoning, subdivision, and building codes.
- **Green infrastructure** - Using rain gardens and permeable pavements to absorb rainfall and reduce flooding.
- **Nature-based solutions** - Restoring River bends, changing land management practices, and creating saltmarshes.
- **Aquifer storage and recovery** - Building infrastructure to increase groundwater storage, which can help with seasonal droughts.
- **Relocating facilities** - Moving utility infrastructure, such as pump stations and treatment plants, to higher elevations.

4. SOCIAL ISSUES

4.1 Impact of New-age Gateway Devices on Children

Why in news?

Recently Australia has passed the world-first bill that bans all vapes from general retail later this year.

What are the New-age gateway devices?

- **New Age gateway devices** - These are devices that were introduced and marketed as a healthier alternative to smoking that would make it easier to quit tobacco.
- **Forms** – Some of the tobacco product used to describe electronic nicotine delivery systems (ENDS) are
 - Vapes, vaporizers, vape pens, hookah pens, electronic cigarettes (e-cigarettes or e-cigs), e-cigars, e-pipes, Heat-not-burn (HNB) devices & other heated tobacco products (HTPs) are
- These are highly engineered drug delivery devices.
- Following a puff, the aerosol is delivered to the user's mouth and lungs and the rest is exhaled.
- The e-liquid contains a range of ingredients such as propylene glycol, nicotine and flavourings.

To know more about e-cigarette, click [here](#)

What are the impacts of new-age gateway devices in children?

- **Affect development of children** - These new-age gateway devices led to a surge in youth vaping, creating a new pandemic.
 - According to the Centers for Disease Control and Prevention, in 2023, e-cigarettes were most commonly used product among middle and high school students in United States.
- **Health Issues** – Continued use of these devices, poses irreversible health risks like lung damage and the e-cigarette or vaping use-associated lung injury (EVALI).
- **Mental health issues** – It leads to mental health challenges such as depressive symptoms, anxiety, perceived stress, and suicide-related behaviours among adolescents.
- **Social Issues** - Those who vape are more likely to experience feelings of loneliness and social isolation when compared to their peers who abstain from these.
- **Addiction** – E-cigarettes are highly addictive, particularly for individuals up to around the age of 25.
- Benzoic acid in nicotine e-liquid produces protonated nicotine which enhances the addictive potential.
- **Cyclical effect** – This is a developmental stage which makes them especially vulnerable to structural and chemical changes induced by nicotine addiction.
- Once addiction takes root, it can increase the likelihood of developing other substance use disorders later in life.
- **E-Waste** - There are no practical means to collect or recycle vapes.
- **Environmental Issues** – volatile organic compounds, heavy metals, such as nickel, tin and lead have toxic effects on the environment – land, air, water.

Why children's are highly susceptible to addiction?

- The age group most at risk remains between 10 and 20 years old, a demographic that manufacturers allegedly exploit through appealing advertising and enticing vaping flavours.
- **Targeted advertisements** – The colourful imagery created by these new-age gateway devices suggests that these products will bring happiness and elevate one's social status.
- It is marketed with addition of flavours such as strawberry, cotton candy, pop rocks, and lemonade.
- **Technology Addiction** – Excessive technology usage is driving some children towards these addictive devices.
- **Peer influence** – Friends' positive attitudes towards vaping is the major introductory factor.
- Children often prioritise peer preferences over their own, leading them to embrace it.
- **Lack of Awareness** - Many children, teenagers, and even parents mistakenly believe that vaping only involves harmless water vapour and pleasant flavours.

How India regulates new-age smoking alternatives?

- Indian had passed Prohibition of Electronic Cigarettes (Production, Manufacture, Import, Export, Transport, Sale, Distribution, Storage and Advertisement) **Act in 2019**.
- **Ban** – It prohibits the production, trade, storage, and advertisement of electronic cigarettes in India.
- **Punishments** - Any person stores any stock of e-cigarettes, will be punishable with an imprisonment of up to six months, or a fine of up to Rs 50,000 or both.
- Any person who contravenes other restrictive provision will be punishable with imprisonment of up to one year, or a fine of up to one lakh rupees, or both.

What lies ahead?

- Comprehensively ban all the all forms of new age gateway devices such as Hookah, vapes.
- Stop the promotion of ENDS as the alternatives to conventional tobacco products.
- Create awareness among people about the negative impacts of all forms of new age gateway devices.
- Strengthen the surveillance and enforcement capacity for effective enforcement of the ban.

4.2 POCSO and Child Pornography

Why in News?

Recently Supreme Court expanded the scope of POCSO act regarding child pornography.

What are the POCSO provisions on Child Pornography?

- **Child Pornography** – The act defines it as any visual depiction of sexually explicit conduct involving a child which include photograph, video, digital or computer-generated image.
- **Child Pornography Offences** - Section 14 and 15 of the POCSO Act provides for the using child for pornographic purposes and possession of pornographic material involving child.
 - **Possession** – Storage or viewing pornographic material in any form involving a child.
 - **Non-Reporting** – Failure to report about child pornographic material to the designated authority is also a punishable offence.
 - **Transmission** - Transmitting or propagating or displaying or distributing child pornographic material in any manner.
 - **Commercial purpose** – Possessing pornographic material in any form involving a child for commercial purpose.

CASES & VICTIMS		
Cases registered under Sections 14 & 15 of POCSO		
Year	Incidents	Victims
2022	696	703
2021	536	540
2020	584	592
2019	1114	1117
2018	812	821

Source: NCRB reports; All India data

Section 67B of the Information Technology (IT) Act penalises use, transmission and publication of obscene materials and browsing, creation, collection, online facilitation of children into any sexual act or conduct an offence.

What are the interpretations of the Supreme Court?

- **Reversal of HC Judgement** - SC set aside Madras High Court decision and held viewing in private, downloading, storing, possessing, distributing or displaying pornographic acts involving children attract criminal liability under the POCSO Act and IT act.
- **Substitute child pornography** - Supreme Court urged the Parliament to amend the POCSO Act to substitute the term “child pornography” with “**Child Sexual Exploitative and Abuse Material**” or CSEAM.
- **Inchoate offences** - Section 15 could even be used to punish the “intent” to commit such an act.
- **Expansion of Section 15(1)** - Failure to “delete or destroy or report” child pornography would allow the court to “indirectly” infer that the concerned individual intended to share or distribute.
- **Constructive possession** - The definition of “possession” to include cases where the individual may not have physical possession of the material, but have the power to control the material in question and the knowledge of exercise of such control.
- **Reporting** – A person will only be absolved of any punishable liability if the person reports the same to the specified authorities.
- **Past Storage** - Charges can be made for possessing child pornographic material even in the past and deletes the same.
- **Intention** - The intention of an accused can be determined based on the manner in which such material is stored or possessed and the circumstances in which the same was not deleted or not reported.

Madras High Court held that mere possession or storage and watching or downloading pornographic acts involving children in private was not a crime.

An inchoate crime is a criminal act that is incomplete or not fully developed, but is punishable because it involves preparation for a further crime.

Why use of the term CSEAM is emphasized than child pornography?

- When combating child sexual exploitation, the use of the correct terminology is important to streamline discussions, and research accurately and avoid confusion.
- **Child sexual exploitation material (CSEM)** – It is the recording of the sexual abuse or exploitation of a child or young person.
- It can include images, videos, or live-streamed content that depict real children or young person’s being sexually abused and exploited.
- **Reflecting true reality**- These images and videos were not merely pornographic but were records of incidents during which children were sexually exploited and abused.

- **Emphasizing seriousness** - The term child pornography fails to describe the true nature of the material and undermines the seriousness of the abuse from the child's perspective.
- **Prevents trivialization** - Pornography is a term primarily used to describe material depicting adults engaged in consensual acts distributed for the purposes of sexual pleasure.
- Using this term in the context of children risks normalizing, trivialising and even legitimising the sexual abuse and exploitation of children.
- **Imagined Consent** - Pornography is often seen as a consensual act between adults and using child pornography term undermines the victimisation.

4.3 Sign Language Day

Why in News?

International Day of Sign Languages was celebrated on September 23.

What is International Day of Sign Languages?

- **Sign Language** – It is a *natural visual-manual language* that fosters communication within both the Deaf and hearing communities.
- **Establishment** – It was done through the **2017 UN General Assembly Resolution**.
- **2024 Theme** - “Sign up for Sign Language Rights.”
- **Significance** - It underscores the vital role of sign languages in promoting the rights and recognition of deaf individuals worldwide.
- **Strengthen Development** - Highlights the importance of early access to sign language and quality education, growth and development of deaf individuals.
- **Preserve Diversity** - Serves as a reminder of the need to preserve sign languages as vital components of cultural and linguistic diversity.
- **Create Awareness** - Highlights the importance of creating positive awareness about Indian Sign Language (ISL) across all sections of society.
- **Fulfil Rights** - Ensures the full realization of human rights for deaf individuals.
- World Federation of the Deaf (WFD) was established on this day in 1951, further reinforcing the global commitment to recognizing and preserving the rich tapestry of sign languages.

There are 70 million deaf people globally, with over 80% residing in developing countries and using over 300 different sign languages.

What are the initiatives launched in India?

- **Indian Sign Language** – It is fundamentally different from Hindi, English, and other spoken languages in India and possesses its *own unique structure* and is *not merely a hand representation* of any spoken language.
- **New ISL Terms** - Indian Sign Language Research and Training Centre (ISLRTC) has introduced 2500 new ISL terms covering subjects like mathematics, science, and various academic fields.
- **New Concept Videos** - 100 Concept Videos were released for hearing-impaired children in the 6th grade explaining subjects like math and science.
- **ISL Dictionary Regional Languages**- ISL dictionary is now available in 10 regional languages, making it easier for diverse communities to engage with ISL.
- **Educational Animated Videos in ISL** - These videos focused on moral values and provide a new learning experience for hearing-impaired children.
- **Deaf Role Model Videos in ISL** – It aims to inspire and motivate hearing-impaired children by showcasing successful deaf individuals who serve as role models.
- **7th Indian Sign Language Competition** - The event featured the winners of the 7th Indian Sign Language Competition.

ISL Competition is a national-level contest showcasing the creativity and skills of students with hearing disabilities.

What are the schemes available for persons with disabilities in India?

- **Nodal Department** - Department of Empowerment of Persons with Disabilities (DEPwD)

- **Assistance to Disabled Persons for Purchase/Fitting of Aids/Appliances (ADIP)** - It provides funds to various Implementing Agencies for distributing aids and assistive devices to eligible individuals with disabilities across the country like Cochlear Implant Surgery for children with hearing impairments.
- **Financial Assistance for Deaf Colleges** – It is offered by DEPwD to colleges specifically for deaf students.
- **Scholarships for Students with Disabilities (Divyangjan)** – It provides scholarships for students with disabilities including for deaf and dumb boys and girls.
- **National Institutes and Regional Centers**
 - Ali Yavar Jung National Institute for Speech & Hearing Disabilities in Mumbai.
 - Indian Sign Language Research & Training Centre (ISLRTC) in New Delhi.
 - 25 Composite Regional Centres (CRCs).
- **Diploma in Teaching ISL** - ISLRTC offers a diploma course in teaching Indian Sign Language, with tuition fees waived for students registered with the Unique Disability ID (UDID).
- **Rights of Persons with Disabilities (RPwD) Act of 2016** – It emphasizes inclusive education as a fundamental right.
 - Educational institutions to ensure that children with benchmark disabilities including Deaf and Dumb children—those with a disability of 40% or more—have access to free, quality education in an inclusive environment until the **age of 18**.
 - 5% reservation for persons with disabilities in government and aided higher educational institutions.
- **Samagra Shiksha Scheme** – It provides dedicated support for Inclusive Education for Children with Special Needs (CwSN).
 - Financial support for aids and educational materials, alongside tailored interventions that foster their participation in schools from pre-school through class XII.
 - Stipend of **Rs. 200 per month** is provided to support girl children with disabilities.
 - Implemented by Department of School Education & Literacy.

G. S. PAPER II

5. INDIAN POLITY

5.1 Bulldozer Justice

Why in News?

Recently, the Supreme Court of India has invited suggestions from the parties concerned to frame appropriate pan-India guidelines on extra-legal demolitions.

What is bulldozer justice?

- It refers to extra-legal demolition of properties of individuals accused of crimes, often targeting their families too and executed via bulldozers.
- **Causes** – Large-scale demolition drives are executed as a means of collective punishment for rioters.
- **Extra-legal demolishment** - The bulldozer action that had started in Delhi's Jahangirpuri in 2022 has now spilled over to different parts of the country.
- The violence that ensued in Nuh, Haryana in 2023, due to a clash between two religious groups, ended with the local administration demolishing a number of homes in the neighbourhood.
- Communal riots in Madhya Pradesh's Khargone also resulted in the demolition of houses and businesses owned by Muslims who were deemed to be 'alleged rioters'.
- **Issues** – In each of these cases, the demolition is justified under municipal laws either on account of

The due process envisaged under judgments of the Supreme Court and High Courts like Sudama Singh & Ors. vs Government of Delhi and Ajay Maken & Ors vs Union of India are completely bypassed in bulldozer justice.

- Action against encroachment or
- Under the pretext of unauthorised construction

Legal Conditions for Demolition of Constructions

- It is on the basis of municipal laws of the state governments like
 - Delhi Municipal Corporation Act
 - Mumbai Municipal Corporation Act
- **Unauthorised constructions**- Structures that have been built without proper permits or in violation of municipal regulations.
- **Encroachments on public land**- Properties that encroach upon public roads or other public spaces.
- **Violation of building codes**- Structures that do not comply with prescribed building codes or safety regulations can be demolished.
- **Violation of municipal regulations**- Non-compliance with local building codes or regulations.

How it violates rule of law?

- **Punitive measure** – This ‘tough on crime’ or ‘eye for an eye’ approach are punitive measures, carried out without due process or proper legal justification.
- **Violates fundamental rights** – Demolishing homes without following legal procedures violates fundamental rights and due process, raising serious constitutional concerns.
- **Loss of Assets**- Individuals may lose valuable assets and investments due to demolitions, which can have long-term financial implications for affected families.
- **Violates family members rights** - It can displace families, leading to significant socio-economic hardships.
- **Ethical issues**- It raises ethical concerns about fairness and justice.

What are the recent SC guidelines?

- Alleged involvement in crime is no ground for demolition of a property.
- The alleged crime has to be proved through due legal process in a court of law.
- No individual’s property should be destroyed solely due to their or a family member’s alleged involvement in criminal activities.
- Even in cases of illegal constructions, demolitions must adhere to proper legal protocols.
- It proposed the respective authorities to lay down certain guidelines on a pan-India basis so that the concerns with regard to the issues raised are taken care of.

The United Nations Basic Principles and Guidelines on Development-based Evictions and Displacement, 2019, prescribe directives to address displacement issue from a humanitarian perspective.

How due process in demolitions can be ensured?

- The cardinal rule is that demolitions must be carried out only in exceptional circumstances, and according to the due process established under law.
- **Classifying the properties** – Classify the types of buildings or constructions that can be brought down by state actions.
- **Assessing surrounding circumstances** – It must strike a balance between state action and the right to adequate housing and resettlement.
- **Data analysis on recent demolitions** – It is to identify clear patterns and better understand the existing gaps in the process.
- **Structured procedural guidelines** – It should in a phased manner, to add multiple checkboxes at each stage which need to be ticked before any irreversible step is taken.

Pre-Demolition Phase

- Burden of proof to show cause should be shifted from the affected person to the authority.
- Publish information about land records and resettlement plans in notice for demolition.

- Ample time be given for those concerned to analyse the situation, seek legal advice and respond to the show-cause notice.
- An independent committee of the State government, with judicial and civil society representatives, should review the proposed demolition.
- Affected persons must be engaged in discussions about alternative housing options and compensation.
- During this phase, the needs of vulnerable groups such as children, the elderly, and disabled persons should be addressed.
- A minimum period of a month should be provided between the intimation of notice to demolish and its execution, allowing affected individuals time to retrieve their belongings.

Demolition Phase

- Minimise the use of physical force in the eviction process.
- Avoid the use of heavy machinery such as bulldozers.
- A requirement for the presence of government officials who are not a part of the authority demolishing the construction.
- Pre-decide the time for the demolition.
- Surprise demolitions should be cause for punitive action against the authority.

Rehabilitation Phase

- Provide adequate and proper temporary or permanent rehabilitation.
- Establish a speedy grievance redress mechanism to afford the affected persons a chance to challenge the decisions that may have been taken at any stage.
- Remedies such as compensation, restitutions and return to the original home must be carved out within the law.

What lies ahead?

- The current task of the Supreme Court i.e., formulating pan-India guidelines must look at the issue through a multidimensional lens.
- In the course of devising guidelines, the Supreme Court must impose a complete moratorium on the punitive demolition of establishments.
- In legitimate instances of demolition, the guidelines should prescribe a strict tripartite procedure to ensure that those at the receiving end are not rendered helpless without any recourse.

5.2 Separate Electorate

Why in News?

September 20 marks the anniversary of the day Mahatma Gandhi began a fast unto death in Pune's Yerawada Jail in 1932 in protest against the award of separate electorates for Scheduled Castes.

What is separate electorate?

- **Separate Electorate** - It is a system of election to legislatures which divides voters along the lines of their religion or ethnicity or any other to ensure that members of the community can elect their own representatives.
- **Double Voting** - A particular community vote 2 times to elect one from that community and to elect for the general electorate.
- **Minorities** - Separate electorates are usually demanded by minorities who feel it would otherwise be difficult for them to get fair representation in government.
 - For example, a separate electorate for Muslims means that Muslims will choose their separate leader by separate elections for Muslims.
- **Introduction** – It was introduced first by the Morley Minto reforms of 1909 and Government of India act 1909 for Muslims.
- All the elections to local bodies and Legislative Council from 1909 to 1946 were held on the basis of the separate electorate system.

- **Extension** - Montague Chelmsford reform and **Government of India Act 1919 extended** the separate electorates for Sikhs, Indian Christians, Anglo-Indians, and Europeans.
- **Communal Award** – It was introduced on August 16, 1932, by the British colonial government under Ramsay MacDonald to grant separate electorates to Marathas, Sikhs, women, Indian Christians, Anglo-Indians including the depressed classes.
- It granted an additional vote in designated special depressed class constituencies for a 20-year term.

Why Ambedkar demanded separate electorate?

- Ambedkar demanded separate electorate for SC during the Simon commission reform in 1937.
- **Outcasted Community** –Although depressed classes are included among the Hindus, they were not treated as an integral part of that community.
- **Political Representation** – Separate electorate would ensure political power for depressed class community.
- **Ineffectiveness of Joint Electorate** - While joint electorates might better help integrate lower castes into the Hindu fold, they would do little to challenge their subservient position.
- **Influence of Majority** - Under joint electorate system, majority may influence the election of the representatives of the Dalits and disable them fighting oppression against the tyranny of the majority.

Why Gandhi opposed Separate electorate?

- **Ineffectiveness of Separate electorate** – Gandhi held that system of separate electorate would not address the issues of oppressed.
- **Larger Interest** – Gandhi advocated that rather than being restricted to just this measly share of seats, lower castes should aspire to rule the kingdom of the whole world.
- **Weakening Hindu Society** – Gandhi believed that Separate electorate system would destroy Hinduism by driving a wedge within the community.
- If separate electorates for lower castes were announced in addition to those for Muslims, this would significantly reduce the power that caste Hindu leadership enjoyed by breaking the consolidated Hindu fold.
- **British Exploitation** –It was a divide and rule system by the British to exploit the internal divisions in Indian society for their own purposes.

What was the Poona Pact?

- **Gandhi's Fast** – On September 1932, at the Yerawada Central Jail in Pune Mahatma Gandhi began fasting unto death against the award of separate electorates to the Scheduled Castes.
- **Poona Pact** – It is an agreement between B.R. Ambedkar and M.K. Gandhi on the political representation of the Depressed Classes.
- It was signed on 24 September 1932 by 23 representatives, including Madan Mohan Malaviya on behalf of Hindus, and Gandhi and Ambedkar representing the depressed classes.
- The Pact contained various provisions for political representation, primary election system, educational grants
- **Reservation** – Instead of Separate electorate, seats were reserved for the Depressed Classes from the general electorate across various provinces.
 - **18% of the seats** in the Central Legislature were reserved for the Depressed Classes.
- **Joint Electorate** - Elections to these reserved seats were to be conducted through joint electorates.
- **Primary Election Method** - All members of the Depressed Classes listed in the general electoral roll of a constituency would collectively form an electoral college.
- This Electoral College would then choose a panel of four candidates for each reserved seat through a single vote method who would become the final candidates for the general electorate's consideration.
- **Franchise** - The Franchise for the Central and Provincial Legislatures of the Depressed Classes was based on the Lothian Committee Report.
- **Duration** - System of primary elections for panel candidates would conclude after the first ten years, unless terminated earlier by mutual agreement

Lothian Committee
recommended qualified
version of universal suffrage
that entailed a literacy test
to elect members to the
provincial legislatures.

- **Educational Grant** - A portion of the educational grant was earmarked to provide adequate educational facilities specifically for members of the Depressed Classes.

5.3 Judicial Appointments Commission

Why in News?

Recently Supreme Court asked the Attorney General for India why the names reiterated by the Supreme Court Collegium for appointment as judges were not yet cleared.

How are judges appointed in India?

- **Constitutional Provision** – **Article 124 and 217** provides for the appointment of Judges to Supreme Court and High court.
- **Memorandum of Procedure (MoP)** – It is an agreement between the judiciary and the government containing a set of guidelines for making appointments to the Supreme Court and High Court.
- **Recommendation** – A high court collegium recommends the list of people to the central government.

Collegium System

- The collegium system is *not mentioned in the constitution* and was created through judicial proceedings.
- **Supreme Court collegium** – It consists of CJI and 4 seniors most judges of the Supreme Court.
- **First Judges Case, 1981 (SP Gupta case)** – It ruled that the *word “consultation” could not be interpreted as “concurrence”* and accordingly, the CJI’s opinion was **not binding** on the executive.
- **Second Judges Case, 1993** – It overruled earlier decisions and held that *“consultation” meant “concurrence”* thus the advice rendered by the CJI on matters of appointments is **binding** on the President.
- CJI was to formulate the opinion *only through a body of senior judges* known as the '**collegium**'.
- **Third Judges Case, 1998** - The court clarified that the *collegium would comprise*
 - Appointments to Supreme Court - CJI and 4 senior-most colleagues
 - Appointments to High Courts - CJI and 2 senior-most colleagues
- Additionally, for HCs, the collegium would consult *other senior judges in the SC* who had previously served in the HC concerned.
- **NJAC** - The government, through 99th constitutional amendment, sought to replace the collegium with the National Judicial Appointments Commission (NJAC).
- It included the Union Minister for Law and Justice and two eminent persons, besides the CJI and next two senior most SC judges.
- **Fourth Judges Case (2015)** - The court ruled that the *primacy of the judiciary in judges’ appointments* was embedded in the **basic structure** of the Constitution.
- It also held that the NJAC law gave politicians an equal say in judicial appointments to constitutional courts and declared NJAC to be unconstitutional.

- **Curation** – The Central government asks for the opinion of state governments and the input from the Intelligence Bureau (IB).
- The government then forwards the files, along with the IB inputs to the Supreme Court collegium.
- **Selection of Judges** – Persons to be appointed or promoted as judges of Supreme Court or High Court is selected by a **Collegium** of 4 Senior Most judges headed by Chief Justice of India (CJI).
- Then the selection is *forwarded to the union law ministry* which then forward it to the President.
- **Difference of Opinion** – In case of difference of opinion about the recommendations the *law ministry can ask the collegium to reconsider* its recommendations.
- **Reiteration** - If the collegium reiterates its recommendation, the *government has to make the appointment*.
- **Appointment** - President appoints the list of persons forwarded to it.
- While appointing High Courts judges the President *consults with CJI, Governor of the State and Chief Justice of that court*.

What are the needs for a judicial appointments commission?

- **Safeguard Democratic System** – Judicial independence could become dangerous and undemocratic unless there is a constitutional discipline with rules of good conduct and accountability.
- **Ensure Accountability** - Judges as persons, or courts as institutions, are entitled to no greater immunity from criticism than other persons or institutions.
- **Warrant Conduct** - Clear statement of the principles of selection is required to ensure the character and conduct of judges in a democracy.
- **Lacks Constitutional Guarantee** – The Collegium system is not mentioned in the constitution and was created through judicial pronouncements *in Second Judges Case, 1993*.
- **Absence of Public Voice** - There is no structure in the collegium system to hear the public in selection process.
- **Dearth of Principle** - Selection of judges of the highest court is done in an unprincipled manner, without investigation or study of the class character by the members of the collegium.
- **Non-transparency** - Lack of public knowledge of how and when a collegium meets, and how it takes its decisions with no official minutes of collegium proceedings.

What shall be the characters of a judicial appointments commission?

- A commission to select judges for the Supreme Court has to be of high standing and of the highest order having status equal to that of the Prime Minister or a Supreme Court judge.
- **Independent** - The commission has to be totally independent and its ideology should be broadly in accord with the values of the Constitution.
- **Ensure sovereignty** - It should uphold the sovereignty of the Constitution beyond pressures from political parties and powerful corporations without fear or favour.
- **Immunity** - The commission can be immune to legal proceedings, civil and criminal.
- **Chairperson** - The commission's chairperson should be the Chief Justice of India to ensure separation of powers and judicial independence.
- **Selection of Member** - An investigation into the character, class bias, and communal leanings may have to be investigated by an independent secret investigation agency functioning under the commission's control.
- **Removal** - It should be removed only by a high tribunal consisting of the Chief Justice of India and the Chief Justice of all the High Court's sitting together and deciding on any charges publicly made.

6. GOVERNMENT POLICIES AND INTERVENTIONS

6.1 India's Policy on Refugees

Why in News?

India has allowed former Bangladesh Prime Minister Sheikh Hasina to stay in India since her forced departure from Bangladesh, despite India having no official refugee policy.

Who are refugees?

- **Refugees** – They are people *forced to flee their own country* and seek *safety in another country* and are unable to return to their own country because of feared persecution.
- **Key international convention**
 - **1951 Refugee Convention** and its **1967 Protocol** to protect refugees.
- They provide the universal definition of who is a refugee and outline the minimum standards for their treatment.
- **Principle of Non-Refoulement** – It states that refugees have a *right not to be sent back to their country of origin* if their life or freedom would be at risk.
- Countries that have signed the Convention are obliged to treat refugees according to the standards outlined.
- **Role of UNHCR** - United Nations High Commissioner for Refugees is the official UN Refugee Agency.
- It promotes States' accession to the Convention and helps governments translate it into national laws.

A refugee is a legal term that carries with it certain protections that refugees are entitled to. The term 'migrant' does not have an international legal definition.

How India deals with refugees?

- **Constitutional provisions**
 - **Article 21** (right to life)
 - **Article 14** (protection against arbitrary actions)
- **Judiciary** – The Supreme Court has ruled that non-return of refugees is part of the right to life.
- **Foreigners Act & Indian Passport Act** – Refugees entering without a visa are treated as illegal immigrants under these laws.
- **Citizenship Amendment Act (CAA)** - It provides a pathway to citizenship for non-Muslim illegal immigrants from neighboring countries, which has faced criticism for being discriminatory.
- **Lack of national policy**- India does not have a formal national policy or law specifically dealing with refugees.
- **Non-signatory to UN convention** – India is **not a signatory** to the 1951 UN Convention or the 1967 Protocol.
- **UNHCR in New Delhi** – It handles refugee status determination (RSD) for asylum-seekers from non-neighboring countries and Myanmar.

Instance of Refugee situation in India

- **Partition of India (1947)** – It led to massive movement of people from Pakistan to India seeking refugee status.
- **Tibetan refugees (1959 onwards)** - Following the failed uprising against Chinese rule in Tibet, the 14th Dalai Lama, along with thousands of Tibetans, fled to India.
- **Chakma and Hajong refugees (1964-1969)** - The Chakma and Hajong communities from the Chittagong Hill Tracts of East Pakistan migrated to India due to religious persecution and displacement caused by the construction of the Kaptai Dam.
- **Bangladeshi refugees (1971)** - During the Bangladesh Liberation War, millions fled East Pakistan (now Bangladesh) due to military atrocities and genocide.
- **Afghan refugees (1980s onwards)** - Due to prolonged conflict in Afghanistan, including the Soviet invasion, Taliban rule, and subsequent unrest, many Afghans sought refuge in India.
- **Sri Lankan Tamil refugees (1983 onwards)** - The civil war in Sri Lanka led to anti-Tamil pogroms and widespread violence which led to thousands of Sri Lankan Tamils sought refuge in India, primarily in the state of Tamil Nadu.
- **Rohingya refugees (2012 onwards)** - Facing persecution in Myanmar's Rakhine State, many Rohingya Muslims fled to neighboring countries, including India.

What are the problems faced by refugees in India?

- **Temporary measures** – Policy that India has adopted for protecting refugees is an adhoc administrative policy on refugees.
- **Discriminatory laws - Citizenship Amendment Act 2019** (CAA), provides citizenship only to Hindu, Christian, Jain, Parsi, Sikh and Buddhist immigrants persecuted in Bangladesh, Pakistan and Afghanistan.
- **Inconsistent laws** – Since refugee law does not exist in India there is no uniformity in the treatment of refugees in the country.
 - After the end of the Sri Lanka civil war in 2009, India has encouraged return through the method of voluntary repatriation.
 - Termining Rohingya in India as “illegal” (in contrast to calling them refugees in Bangladesh) and pledging to send them back to Myanmar.
- **Social exclusions** – There is physical and emotional exploitation by the local residents since they are not citizens of India.
- **Deprivation of basic rights** – Basic necessities of life such as food, shelter and employment are not provided to them and privileges are also not conferred.

India is very reluctant to sign 1951 Refugee Convention as refugees are defined as people who have been deprived of their civil and political rights but not their economic rights.

What are the steps needed to have a fair refugee policy in India?

- **Ratifying international conventions** - India should consider ratifying the 1951 Refugee Convention and its 1967 Protocol, which set out the rights of refugees and the obligations of states to protect them.
- **Formulating national refugee law** - India should enact a comprehensive national refugee law to provide a legal framework for the protection and management of refugees, distinguishing them from other migrants and ensuring their rights.
- **Ensuring access to basic human rights** – It includes healthcare, education, and legal protection.
- Providing refugees with the right to work and earn a livelihood, which helps in their integration and reduces dependency on state resources.
- **Seeking international assistance** – It includes seeking financial aid, technical support, and resettlement opportunities for better management of refugees.
- **Involving civil society** - Engage civil society organizations, NGOs, and refugee communities in the policy-making process to ensure that refugee voices are heard, and their needs are addressed.

To know more about World Refugee Day, click [here](#)

6.2 10 years of PM Jan Dhan Yojana (PMJDY)

Why in News?

Recently, the Pradhan Mantri Jan Dhan Yojana (PMJDY) completed 10 years of its implementation.

What is Jan Dhan Yojana?

- **Launch-** It is a government-led **financial inclusion initiative** launched in **2014**.
- **Objective-** It aimed to provide universal access to banking facilities for all households in the country, especially the unbanked.
- **Services-** It offers basic savings accounts, remittance services, and access to credit, insurance, and pensions at affordable costs.
- **Universal coverage-** It covers all households across rural and urban areas.
- **Zero balance accounts-** PMJDY accounts can be opened with zero balance and RuPay debit cards are also issued.
- **Overdraft (OD) facility-** Rs 10,000 for Aadhaar-linked accounts after 6 months of satisfactory operation.
- No conditions for OD up to Rs 2,000 and is available to individuals aged 18-65 years.
- **Insurance coverage-** It provides personal accident insurance cover of Rs 2 lakh for accounts opened after August 28, 2018 and includes coverage of Rs 1 lakh for permanent partial disability.
- **Business correspondents-** A minimum monthly remuneration of Rs 5,000 is provided to business correspondents acting as a link between account holders and banks.
- **Eligibility for other schemes-** PMJDY account holders are eligible for Direct Benefit Transfer (DBT), PMJJBY, PMSBY, Atal Pension Yojana (APY), and MUDRA scheme.

What are the achievements of Jan Dhan Yojana?

- **Widens financial access-** It significantly increasing banking penetration, especially in rural and semi-urban areas.
 - Over 53.1 crore bank accounts have been opened under PMJDY
- **Reduces rural-urban disparity** – It helped narrow the gap in access to the formal banking system that existed between rural and urban areas.
 - Around 67% of the accounts opened are in rural/semi-urban areas.
- **Bridges gender gap** – It increased financial access to women.
 - About 56% of the accounts opened under PMJDY belong to women.
- **Enables DBT** - PMJDY has facilitated efficient transfer of subsidies and benefits directly into beneficiaries' bank accounts, ensuring accurate targeting and reducing leakages.
 - DBT is now being used in hundreds of schemes whose total cumulative transfers amount to Rs 38.5 lakh crore.

- **Support during crisis-** JAM and DBT facilities has also been used by the government to provide support to citizens during times of distress.
 - For instance, during the initial days of the pandemic, the government had transferred Rs 500 to 20 crore women Jan Dhan account holders.
- **Economic gains** - The JAM framework also forms an *integral part of the Unified Payments Interface (UPI)* which has transformed the payment systems in the country.
 - In July, 14.4 billion transactions were processed through this platform as per data from NPCI.
- **Boost to financial literacy-** It has raised awareness and understanding of financial products and services among the unbanked population.
 - A significant share of these UPI transactions are of a lower ticket size, 85% of peer to merchant and 56% of peer to peer transactions are of less than Rs 500.
- It indicates that the changes in the country's payment systems have eased the ability of households, even low income ones, to engage in formal financial transactions in their daily lives.

The JAM trinity (Jan Dhan, Aadhaar and mobile) has enabled the government to shift to a more efficient system for transferring benefits directly to beneficiaries.

The government aims to open more than 3 crore new accounts under PMJDY during the financial year 2024-25.

What lies ahead?

- Develop tailored financial products and services to the needs of low-income households and those with irregular income streams.
- Continue efforts to close the remaining gaps in financial access, particularly in remote and underserved regions.
- Leverage advancements in technology to enhance the efficiency and reach of financial inclusion initiatives.
- Introduce Unified Lending Interface (ULI) to provide credit to segments of society that remain excluded from formal financial services.

Unified Lending Interface is a standardized, plug-and-play system that aims to reduce the need for extensive documentation from borrowers. It is designed to address unmet credit demand, particularly for agriculture and MSMEs by digitizing access to data like land records.

Quick Facts

Other Financial Inclusion Initiatives in India

- **Aadhaar-Enabled Payment System (AEPS)** - It utilizes biometric authentication to facilitate easy banking access.
- **Direct Benefit Transfer (DBT)** - It ensures subsidies and other financial benefits reach the beneficiaries directly in their bank accounts.
- **Micro Units Development & Refinance Agency Bank (MUDRA)** – It provides loans to small businesses and micro-enterprises.
- **Insurance and pension schemes** – Programs like Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY), Pradhan Mantri Suraksha Bima Yojana (PMSBY), and Atal Pension Yojana (APY) offer insurance and pension facilities to the financially underserved.
- **Unified Payments Interface (UPI)** - Facilitates instant and easy mobile-based financial transactions.
- **Financial literacy campaigns** - Educating the unbanked and underbanked on financial services and their benefits.

6.3 Issues of Centralised Model of Education

Why in News?

This year, September 5 was marked as Student-Teacher Solidarity Day by many students and teachers wearing black badges to protest against the present education crisis in the country.

How India is pushing for centralised model of education?

- Education is in concurrent status as per the Indian Constitution.

- The last decade has witnessed an unprecedented trend of increasing centralisation and control by the Union government.
- **Centralised model** – It requires states to
 - Be in conformity with [NEP](#).
 - Contribute 40% of a much larger sum for centrally sponsored schemes
 - Implement the CBSE curriculum in case of PM-Shri Schools
- Both Kerala and Tamil Nadu States have been under *implicit pressure to sign a MoU* to implement the scheme of selected PM-SHRI schools.
- Schools from States which are being brought under this exclusive centralised model will be *taken away from the State Boards*.
- These selected schools along with disproportionately generous funding, can be *used to showcase as the “better performing” exemplars than the poor ‘others’* under the state system.
- The impact of such discrimination within the State system can be damaging, to say the least.

September 5 is celebrated as Teachers' Day to mark the birth anniversary of Dr. S. Radhakrishnan. He chaired the 1st Education Commission (1948-49).

Pradhan Mantri Schools for Rising India (PM SHRI) schemes, a centrally sponsored scheme was launched in 2022 to transform selected existing schools into model institutions.

What are the funding issues faced by state education?

- **Delays in funding** - Kerala and Tamil Nadu have been facing protracted delays with respect to centrally funded schemes.
- They have *not received pending instalments* of the Samagra Shiksha Abhiyan (SMSA).
- **Disproportionate funding** - The current budget allocates a *large portion of its funds to PM-SHRI*, while substantially reducing funding to SMSA.
- According to the 'Centre for Budget Governance and Accountability', the central budget allocations to the Department of School Education budget between the years 2019-20 and 2024-25
 - **Funding to PM-SHRI** – It *increased* from 19% to 29%
 - **Funding share of SMSA** – It *dropped* from 62% to 51%
- The PM-SHRI schools selected are 8,108 in number and constitute less than 1% of the 11.6 lakh schools that get funding under the SSA.

Samagra Shiksha Abhiyan aims to ensure equitable access to quality education for all children, including the 6-14 year old under the Right to Education Act.

Undemocratic Focus of Funds

- Central funding is leveraged to push through its agenda of
 - Commercialisation
 - Gross stratification of the public system
 - Early vocationalisation (which can be caste-based) for the proletariat
 - Distortion and communalisation of curricula

Why Tamil Nadu opposes NEP?

- **Disadvantageous provisions** – The state has *already achieved a Gross Enrolment Ratio (GER)* higher than the target of 50% proposed by NEP to be attained by 2035.
- **Deprives formal education** - It critiqued that vocational education beginning from Class 6, would alienate and *exclude vulnerable sections from formal education* and the formal economy.
- **Impact of external assessments** – It critiqued that NEP mandated external tests can have an adverse impact on children being failed and *forced to drop out*.
- It also insisted that continuous internal assessment, as per the original RTE mandate, is most appropriate for young students.

As per Dr. Zakir Hussain, chairperson of the Basic Education Committee (1938), and co-founder of Jamia Millia Islamia, the exclusive control of education by the State has been an important factor in facilitating the maintenance of totalitarian tyrannies.

What lies ahead?

- Higher education is, undoubtedly, an obligation of the State but State aid is not to be confused with State control over academic policies and practices.

7. HEALTH

7.1 Silicosis

Why in news?

The UK researchers suggest that stricter daily limits on silica dust exposure across various industries could save 13,000 lives worldwide.

What is silicosis?

- **Silicosis** – It is a *respiratory disease* which causes a *hardening of the lungs*.
- A type of **pneumoconiosis** that is a broader category of lung diseases caused by inhaling various types of dust.
- **Causes** – It is caused *by silica dust or silica crystals*, which are found in soil, sand, concrete, mortar, granite and artificial stone.
- **Vulnerable areas** - It is common in industries like construction, mining, oil and gas extraction, kitchen engineering, dentistry, pottery and sculpting.
- **Inhalation of dust** - When the materials are cut or drilled, crystalline silica is released into the air as a very fine dust.
- Workers breathe it in as they work, especially where industrial health and safety standards are poor.
- **Onset of symptoms** – It usually takes *10 to 20 years of exposure* to silica dust to develop the disease.
- It can lead to other serious diseases, including lung cancer, but scientists aren't sure exactly how this happens.
- **Treatment** – It is a progressive disease and *has no cure*.

The issue of silicosis was likely to be much worse in developing countries, where there are few or no safety measures for silica dust. Miners in developing countries are exposed to a lifetime's worth of dust in a year's work.

Global practice on silica dust exposure limits

- Australia has even banned engineered stone due to high silica dust levels.
- **Recent Study** – The researchers found that if average exposure over a 40-year working lifetime in mining was halved, from 0.1 mg/m³ to 0.05 mg/m³, there would be a reduction of silicosis cases by 77%.

Countries	Exposure Limits
UK and most European nations	0.1 mg/m ³
China	1 mg/m ³
USA	0.5 mg/m ³

How India controls silicosis?

Village of Widows in Rajasthan

- **Village of widows** - In the *village of Budhpura*, the majority of men have died from a lung disease called silicosis.
 - Mine Labour Protection Campaign (MLPC) - In Budhpura village, Rajasthan nearly 180 widows have been identified with silicosis since 2014.
- Health experts say it is a result of inhaling small dust particles from the rocks.
- **Challenges** - Many of the sandstone mines operate on a small scale, so the sector is *largely unorganised*.
- That leaves millions of labourers with little to *no education or protection* vulnerable to silicosis.
- But as the only industry in the area, villagers have no choice but to *work in these mines in order to feed their families*.

The state of Rajasthan produces 70% of the sandstone in India. Much of it is exported overseas to countries like Germany and the United Kingdom for use in construction and landscaping.

- **National Programme on Elimination of Silicosis** - It is a policy document that aims to protect workers from silicosis, an incurable and often disabling disease.
- It is a part of the International Labour Organisation (ILO) and World Health Organisation's (WHO) **Global Programme for the Elimination of Silicosis (GPES)**.

- It includes a feasible prevention strategy that considers local factors.
- The goal is to reduce the prevalence of silicosis and eliminate it from workplaces by a certain date.

Key areas of National Programme on Elimination of Silicosis

- **Prevention**- Implementing safety measures and best practices in industries where silica exposure is common, such as mining, construction, and manufacturing.
- **Surveillance and Screening**- Conducting regular health check-ups and screenings for workers to detect early signs of silicosis.
- **Treatment and Care**- Providing medical care and support for affected individuals, including treatment and rehabilitation.
- **Awareness and Training**- Educating workers and employers about the risks of silicosis and how to mitigate them.
- **Policy and Research**- Developing and enforcing regulations to reduce silica exposure and supporting research to better understand and address the disease.

- **Supreme Court** – It had directed the
 - **National Green Tribunal**– To oversee the impact of silicosis-prone industries across India.
 - **National Human Rights Commission** - To oversee the compensation process across the States.
 - **Employees' State Insurance Corporation** and the Chief Secretaries of the respective States – To adhere to the directions of the NHRC and collaborate with them.
 - To ensure that the compensation distribution process is carried out efficiently and without delay.

What lies ahead?

- Follow the established methods like
 - Using water suppression methods of foams and mists to precipitate dust out of air effectively
 - Better ventilation
 - Personal protective equipment

Quick Facts

Other Occupational Lung Diseases

- Work-related lung diseases are lung problems that are caused by certain work environments.
- They are caused by breathing materials into the lungs.
- **Incubation** – Disease conditions may develop slowly and can persist even after exposure ends.
- **Asbestosis**- It is a lung disease from inhaling asbestos fibers, affecting plumbers, pipe fitters, steamfitters, shipbuilders, and construction workers.
- **Lung diseases from bio dusts and bioaerosols**- These are caused by inhaling particles from plants, animals, and microbes, impacting agricultural workers, waste handlers, wood processors, and food processors.
- **Chemical pneumonitis**- These results from inhaling toxic chemicals, with risks for workers handling certain metals and chemicals.

7.2 India Health Expenditure

Why in News?

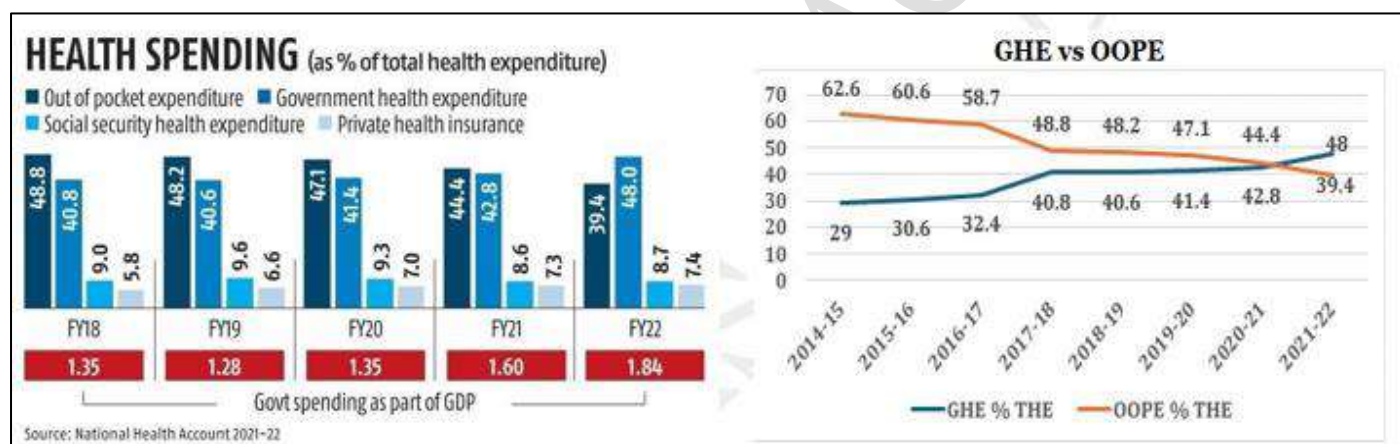
The National Health Accounts Estimates for 2020-21 and 2021-22 was released recently by the Union Health Ministry.

What is the status of Health Expenditure in India?

- **National Health Account** – It provides a systematic description of the financial flows in India's health system by different sources.
- It is released by Ministry of Health and Family Welfare.

- It shows how the money is spent, how healthcare is provided, and the nature of healthcare services that are used.
- The NHA estimates are based on the globally accepted framework of ‘A System of Health Accounts (SHA 2011), 2011’ which facilitates inter-country comparisons.
- SHA 2011 is developed by World Health Organization (WHO).
- The total health expenditure in India has risen to **3.8 % of the GDP**.

Total Health Expenditure	
Government Health Expenditure (GHE)	Expenditures from Union Government, State Governments, Rural and Urban Local Bodies including quasi-governmental organisations and donors in case funds are channeled through Government organisations.
Out-of-pocket expenditure (OOPE)	Expenditures directly made by households at the point of receiving health care.
Social Security Expenditure (SSE)	It includes government-funded health insurance (both Center and State) and medical reimbursement to government employees.
Private Health Insurance (PHE)	Spending through health insurance companies where households or employers pay a premium to be covered under a specific health plan.



- **Decline in OOPE** - It declined to **39.4 %** of total health expenditure (THE) in 2021-22 from 48.8 % in 2017-18.
 - **National Health Policy**- It aims to reduce OOPE as a proportion of total health expenditure to 35% by financial year 2025-26 (FY26).

What are the reason for reduced OOPE?

- **Increased government contribution** - GHE rose marginally from 1.35% of GDP, in 2017-18 **to 1.84 % in 2021-22**.
- Share of government health expenditures in total health expenditures has also shown a significant increase from 29.0 % in 2014-15 to **48.0 % in 2021-22**.
- **Increased per capita GHE** - In per capita terms, GHE has tripled, from Rs. 1,108 to Rs. 3,169 between 2014-15 to 2021-22.
- **Expanded private health insurance** - Coverage of private health insurance risen from 5.8 % in 2017-18 to **7.4 % in 2021-22**.
- **Increased social security spending** – The proportion of total health expenditure allocated to social health insurance programs has increased from 5.7 % in 2014-15 to **8.7 % in 2021-22**.



National Health Policy has targeted **2.5 % of GDP** for public health expenditure by 2025.

- **Government Health Schemes** - More than Rs 1 lakh crore savings have accrued from the Ayushman Bharat PMJAY.
- Free Dialysis scheme, launched in 2015-16 have benefited 25 lakh people.

What are the benefits of reduced OOPE?

- **Universal Health Coverage** - decrease in OOPE is a constructive sign of realising Universal Health Coverage (UHC) as postulated in the National Health Policy, 2017.
- **Prevents financial ruin** - Reduced OOP protects against Unexpected medical expenses can lead to bankruptcy or severe debt.
- **Enables savings** - With lower healthcare costs, individuals can allocate more of their income towards savings or other financial goals.
- **Increases access to care** - Lower costs can encourage people to seek preventive care and timely treatment, leading to better health outcomes.
- **Reduces delayed care** - Reduced OOPE can encourage people to seek treatment when needed without worrying about financial constraints.
- **Reduces poverty** - Reducing OOPE costs can help alleviate poverty and improve overall societal well-being.
- **Increases productivity** - Reduced OOPE can contribute to a healthier workforce and a stronger economy thus improving the productivity.

What lies ahead?

- Expand health insurance programmes to cover outpatient and preventive health services.
- Include people above the poverty line also under the social security schemes to achieve universal coverage.
- Cover the whole household irrespective of the number of members living in the household.
- Enrol urban poor e in health insurance programmes without at the earliest.

8. GOVERNANCE

8.1 India's Policy Transformation in Corporate Governance

Why in News?

India's economic trajectory was defined by two key policy shifts: the planned development of 1951 and the liberalization of 1991, both catalyzing growth through distinct government roles.

What is corporate governance?

- **Corporate**- A business organisation having a separate legal entity, ie an identity distinct from its owners, is called a corporation or a company in India.
- **Section 2(11) of the Companies Act**, 2013 defines "body corporate" or "corporation" to include
 - Private Companies
 - Public Companies
 - Personal companies
 - Small companies
 - Limited Liability Partnerships (LLPs)
 - Foreign companies
 - Companies incorporated outside India
- **Corporate governance** - It refers to the system of rules, practices, and processes by which a company is directed and controlled.
- It involves balancing the interests of a company's many stakeholders, such as shareholders, management, customers, suppliers, financiers, government, and the community.



How corporates are governed in India?

- **Legislations**
 - **Companies Act, 2013** - It is the primary legislation governing corporate governance in India.
 - It includes provisions related to the composition & functions of the board, appointing auditor, disclosures, & shareholder rights.
 - **Securities Contracts (Regulation) Act, 1956**- It governs the listing of securities and enforces regulations for stock exchanges and listed companies, contributing to corporate governance.
- **Regulations** - SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015 apply to listed companies.
- It mandate specific corporate governance norms, including board composition, audit committees, and the role of independent directors.
- **Guidelines** - National Guidelines on Responsible Business Conduct (NGRBC) was issued by the Ministry of Corporate Affairs.
- It encourage businesses to adopt sustainable and ethical practices.



What are the major episodes of policy transformations in India?

1951-1965	• First major transformation
Mid-1960s to Late-1970s	• Low growth episode
Post-1980 & Liberalisation in 1991	• Second major transformation

- **First major transformation** - The launch of the First Five-Year Plan in 1951 marked the beginning of India's planned economic development.
- The emphasis on public-sector development, particularly in heavy industries, with significant private investment was also taking place.
- Despite modest growth, it marked a substantial shift from the pre-Independence annual growth rate of 0.5%, achieving a nine-fold increase.
- **Low growth episode**– It was marked by droughts, a new agricultural policy, and political instability, this period saw relatively low economic growth.
- **Second major transformation** - The 1980s saw the beginning of higher growth, but a significant policy shift from public to private sector investment occurred after the 1991 liberalisation.

- The most profound change post-1991 was the financial liberalisation, including opening banking and mutual funds to the private sector and reforming the share market.
- *New capital issues* by non-government public limited companies grew significantly, from Rs.600 crore in 1981-82 to Rs.1.5 trillion in 2021-22.
- **Evolution of India's trade patterns**- India's share in world merchandise exports declined from 1.9% in 1951 to 0.4% by 1980 but has since recovered to 1.8%.
- India's share in global trade in commercial services increased from 0.6% in 1990 to 4.3% in 2023.

What are the challenges associated with corporate governance?

- **Conflict of interest**- Directors and management may face conflicts between their personal interests and those of the company, leading to unethical decisions.
- **Lack of independence**- Independent directors may not be truly independent, compromising their ability to provide unbiased oversight.
- **Ineffective board functioning**- Boards may be dominated by a few individuals, reducing their effectiveness in oversight and decision-making.
- **Weak enforcement of regulations**- Although laws are in place, the enforcement of corporate governance regulations can be inconsistent, allowing malpractices to persist.
- **Transparency issues**- Companies may fail to provide adequate and accurate information to stakeholders, undermining trust and accountability.
- **Cultural and ethical deficiencies**- A lack of emphasis on ethical behavior and corporate responsibility can lead to governance failures.

What lies ahead?

- Shift to a neutral, market-friendly relationship to avoid cronyism and ensure fair competition.
- Reform PLI Scheme to foster a more dynamic corporate environment.
- Encourage the shift from family-managed to professionally managed enterprises through stronger competition.
- Raise the competence of the Competition Commission for enhancing private sector management dynamism.
- Regulate monopoly infrastructure to prevent private exploitation.
- Encourage companies to adopt and integrate ethical practices and corporate social responsibility into their business models.
- Utilize technology for better governance practices, such as digital voting platforms for shareholders and automated compliance monitoring systems.

Political acceptability comes more readily to a government visibly involved in supporting non-corporate private sector, reducing income inequalities and regional disparities, and addressing caste concerns.

8.2 Jammu & Kashmir Administration

Why in News?

The first phase of polling for the Jammu and Kashmir Assembly after the abrogation of Article 370 is held.

How is Jammu & Kashmir Administered?

- **J&K Union Territory** - The constitutional changes of August 2019 took away the statehood of Jammu and Kashmir after the [abrogation of Article 370](#) and made it a Union Territory.
- **J&K Administration** – It is administered *by Lieutenant Governor (LG)*, with the aid of Council of Ministers headed by a Chief Minister.
- **J&K Assembly** - The Jammu and Kashmir Reorganisation Act, 2019 created two UTs
 - UT of Ladakh without a legislature
 - UT of Jammu and Kashmir with a legislature
- **Council of Ministers** - The Union Territory of Jammu and Kashmir will have a Council of Ministers of not more than 10% of the total number of members in the Assembly.
- The Council will aide and advise the Lieutenant Governor on matters that the Assembly has powers to make laws.

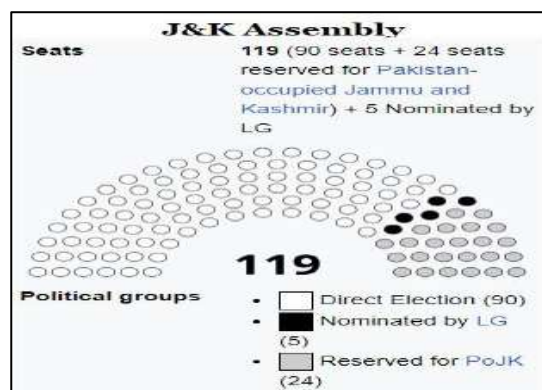
Article 239 provides that every union territory shall be administered by the President, through an administrator.

Article 239 A provides for Creation of local Legislatures or Council of Ministers or both for certain UTs.

- **Legislative powers of Assembly** - It can make laws for the whole or any part of the Union territory of Jammu and Kashmir with respect to any of the matters enumerated in the State List, except “Public Order”, “Police” and Concurrent list.

What are the powers of J&K LG?

- The Reorganisation Act of 2019 also specifies the powers of the J&K LG and the roles of the Council of Ministers.
- **Executive Powers** - Chief Minister shall be appointed by the Lieutenant Governor and the other Ministers shall be appointed by the Lieutenant Governor on the advice of the Chief Minister.



- The Ministers shall hold office during the pleasure of the Lieutenant Governor.
- The Lieutenant Governor shall appoint a person who is qualified to be appointed a Judge of the High Court, to be Advocate-General for the Union territory of Jammu and Kashmir.
- **Legislative Powers** – Lt. Governor summon the Legislative Assembly to meet at such time and place as he/she thinks fit.
- **Oath Administration** - Every member of the Legislative Assembly shall, before taking his seat, make and subscribe before the Lieutenant Governor of the said Union territory.
- **Assembly Address** - At the commencement of the first session after each general election to the Legislative Assembly and at the commencement of the first session of each year, the Lieutenant Governor shall address the Legislative Assembly.
- **Sending Message** - The Lieutenant Governor may also send messages to the Legislative Assembly whether with respect to a Bill then pending in the Legislative Assembly.
- **Assent to Bills** – A Bill passed by the assembly becomes an act, only after the assent of Lieutenant Governor.
- **Financial Powers** - Contingency Fund of the Union territory of Jammu and Kashmir is administered by the Lt. Governor.
- The accounts of the Union territory of Jammu and Kashmir shall be kept in such form as the Lieutenant Governor may, after obtaining advice of the Comptroller and Auditor General of India.
- **Financial Bills** – Any bill involving financial obligations undertaken or to be undertaken by the Government of the Union territory requires the prior recommendation of the Lieutenant Governor.
- **Discretionary Powers** - The Lieutenant Governor has discretionary powers on matters,
 - That falls outside the purview of the powers conferred on the Legislative Assembly i.e. “Public Order” and “Police”.
 - Required by or under any law to act in discretion or to exercise any judicial functions.
 - Related to All India Services and Anti-Corruption Bureau.”
- Decision of the Lieutenant Governor in his discretion shall be final.
- **Judicial Exemption** - Validity of anything done by the Lieutenant Governor shall not be called in question on the ground that he ought or ought not to have acted in his discretion.
- Advices tendered by Ministers to the Lieutenant Governor shall not be inquired into in any court.

Comparison of Administration of UTs of Delhi and J&K		
	Delhi	Jammu & Kashmir
Constitutional Provision	Article 239AA	Article 239A
Statue	Government of National Capital Territory of Delhi Act, 1991.	Jammu and Kashmir Reorganisation Act, 2019.
Administrator	Lieutenant Governor (LG)	Lieutenant Governor (LG)

Subjects Exempted from Assembly	Land, Public order, and Police	Public order, and Police
Administration of Civil Services	LG through National Capital Civil Service Authority	Lieutenant Governor

9. INTERNATIONAL RELATIONS

9.1 India's Act East Policy

Why in news?

The recent visit of Prime Minister of India to Singapore and Brunei are part of India's broader diplomatic initiative, the Act East Policy, which aims to foster stronger relationships in the Asia-Pacific region.

What is India's Act East Policy?

- It is a policy that focuses on the extended neighbourhood in the Indo-Pacific region, with ASEAN as its core.
- **Formation** – It was *launched in 2014* at the 12th ASEAN-India Summit in Myanmar.
- It is an *extension of Look East Policy of 1992*, a strategic foreign policy aimed at engaging with Southeast Asia.
- **Objectives** – It seeks to promote *economic cooperation, cultural ties* and develop strategic relationships with countries in the Indo-Pacific region.
- It also aims to provide improved regional connectivity, trade, and strategic cooperation.
- **Working** – It promotes continuous engagement at bilateral, regional and multilateral levels.
- It works through various tools like Lines of Credit (LOC), grant assistance, and capacity-building programmes like the Indian Technical and Economic Cooperation Programme (ITEC).
- **Dialogue partners** – Its central focus is on ASEAN countries, which include Indonesia, Vietnam, Malaysia, Thailand, and Myanmar.
- India has also forged partnerships with Japan, South Korea, and Australia under this policy.

Association of Southeast Asian Nations (ASEAN) comprises of 10 Southeast Asian states which promotes intergovernmental cooperation and facilitates economic integration amongst its members.

In 2018, ASEAN leaders were in India for a summit and the Republic Day parade.

To know about India's Neighbourhood Policy, click [here](#)

What are the key features this policy?

- **Indo-Pacific focus**- It centres on the Indo-Pacific region, with ASEAN at its core, aiming to build a robust strategic presence.
- **Connectivity**- To strengthen connectivity between India's Northeastern states and neighbouring countries, fostering closer socio-economic ties.
- **Institutional dialogue**- It creates a platform for consistent institutional dialogue and cooperation with partner countries in the region.
- **Three pillars**- It focuses on three main areas of cooperation
 - Political and security matters
 - Socio-cultural exchange
 - Economic partnerships

India's presence in the Malacca Strait, has also allowed it to influence maritime activities in the Indo-Pacific region. It is the shortest shipping route between the Far East and the Indian Ocean.

What are important initiatives under this policy?

- It has led to numerous development projects aimed at strengthening infrastructure and fostering closer ties with regional neighbours.

Name	Objective
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India-Myanmar-Thailand Trilateral Highway Project	<ul style="list-style-type: none"> • It connects India's Northeast with Myanmar and Thailand. • It enhances trade and travel between the regions.
Kaladan Multi-modal Transit Transport Project	<ul style="list-style-type: none"> • It focuses on boosting connectivity between India and Myanmar. • It aids in the development of India's landlocked Northeastern states
Rhi-Tiddim Road Project	<ul style="list-style-type: none"> • It further strengthens connectivity between India and Myanmar.
Border Haats	<ul style="list-style-type: none"> • It is a border trade centre. • It is to foster closer economic relations between India and its neighbours mainly Bangladesh and Myanmar.
Agartala-Akhaura Rail Link	<ul style="list-style-type: none"> • It connects India and Bangladesh.
Mahabahu-Brahmaputra Inland Waterway Programme	<ul style="list-style-type: none"> • It is designed to improve intermodal transport links and inland waterways in the region.

What are the significance of this policy?

- **Counters China** - By increasing its engagement with Southeast Asian nations through defence, diplomacy, and economic ties, India positions itself as an alternative to China, offering a more balanced and collaborative approach.
 - India will provide an adequate number of BrahMos Missiles to the Philippines to beef up its security in the context of the increasing threat from China in the South China Sea.
- **Promotes peace in Indo-pacific** - India aims to maintain freedom of navigation and uphold the rule of law in the Indo-Pacific.
- **Enhances regional security** – It aligns with India's involvement in the Quad (Quadrilateral Security Dialogue), further boosting regional security and cooperation.

What lies ahead?

- Address regional challenges to maintain a stable and prosperous Indo-Pacific region.
- Strengthen trade relations by negotiating and implementing comprehensive free trade agreements (FTAs).
- Enhance market access for Indian businesses in East Asia.
- Foster partnerships with like-minded nations to address global challenges such as climate change, digital economy, and sustainable development in need of the hour.

9.2 Summit of the Future

Why in News?

Recently, the Summit of the Future was held at New York in September 2024.

What is Summit of the Future?

- It is a high-level event, bringing world leaders together to forge a new international consensus on better future.
- **Organised by** – [United Nations](#)
- **Theme** - 'Multilateral Solutions for a Better Tomorrow'.
- **Aim**
 - Accelerate efforts to meet our existing international commitments.
 - Take concrete steps to respond to emerging challenges and opportunities.
- **Outcome** - It concluded with the adoption of an outcome document - A ***Pact for the Future***, along with two annexes,

- **Global Digital Compact**
- **A Declaration on Future Generations.**
- **Pact for the Future** – It is an inter-governmentally negotiated, action-oriented Pact covering both new areas and issues on which agreement has not been possible in decades.
- **Global Digital Compact** - It is the first comprehensive global framework for digital cooperation.
- It explicitly includes human rights and concrete commitments to accelerate progress on the 2030 Agenda and puts emphasis on the role of non-state stakeholders.
- Commitment to Digital public goods, Digital public infrastructure, Open-source data, Models and standards and Data governance.
- Aiming at **Global AI Governance**, establishment of
 - AI Scientific Panel, Global policy dialogue on AI and Global Fund for AI capacity building.
- Make the digital space safer for all through greater accountability of tech companies and social media platforms and actions to tackle disinformation and online harms.
- **A Declaration on Future Generations** – It is to help Member States better consider future generations to inspire long-term anticipatory governance at the international level.
- **Follow up events**
 - High-level review for the Global Digital Compact in 2027
 - High-level plenary meeting in 2028 for the Declaration on Future Generations
 - Heads of State and Government meeting at the beginning of the 83rd session of the General Assembly in 2028 for a comprehensive review of the Pact for the Future.
 - 4th International Conference on Financing for Development
 - **2nd World Summit for Social Development.**

What are provisions of the pact on sustainable development and financing?

- **2030 Agenda** - Accelerate the implementation of the 2030 Agenda and [2023 SDG Summit Political Declaration](#).
- Advance sustainable development beyond 2030.
- Finance for the SDGs and close the SDG financing gap, including through an SDG Stimulus.
- **Tax Cooperation** - Inclusive and effective international tax cooperation
- Global minimum level of taxation on high-net-worth individuals.
- **Climate Change** – Endorsed the need to keep global temperature rise to 1.5°C above pre-industrial levels.
- Transition away from fossil fuels in energy systems to achieve net-zero emissions in 2050.
- Promote disaster risk-informed approaches to sustainable development.
- **Environment** - Promotion of sustainable consumption and production patterns
- Conclusion of a legally-binding agreement on plastic pollution
- Reversing biodiversity loss and protecting ecosystems
- Increased adequate, predictable and sustainable funding for the UN Resident Coordinator System.

What are provisions of the pact on international peace and security?

- **Sustaining peace** - Ensure National whole-of-society sustaining peace efforts through the development and implementation of voluntary national prevention strategies.
- **Protecting civilians** - Pledged to refrain from the use of explosive weapons in populated areas.
- Strengthen accountability for serious crimes and gross violations such as gender-based violence and starvation as a weapon of war.
- **Humanitarian assistance** - Increase the use of innovative and anticipatory financing mechanisms to eliminate famine.
- Accelerate the implementation of commitments on Women, Youth, Peace and Security.

- Review of UN peace operations to recommend how they can adapt to new and emerging challenges
- **Counter Terrorism** - Address all drivers and enablers of terrorism and violent extremism conducive to terrorism, including in the digital sphere.
- Prevent and combat transnational organized crime, including cybercrime.
- **Nuclear Disarmament** - Recommitment to nuclear disarmament in nearly 15 years, through a clear commitment to the goal of the total elimination of nuclear weapons.
- **Avoid weaponization of emerging technologies** - Commitment to prevent an arms race in outer space
- Discussions on an instrument to govern the use and development lethal autonomous weapon systems
- Continued assessment of risks around the military applications of AI.

What are provisions of the pact on science, technology and innovation (STI) and digital cooperation?

- **Reduce global disparities in STI** - Addresses barriers to the access, participation and leadership of women and girls in these areas.
- Ensure human rights and ethical principles in the development and use of new technologies.
- Increased use of science in policy-making to address complex challenges.
- Provide more funding for SDG-related research and innovation.
- **Youth** - Expand and strengthen youth participation in global decision-making, including in UN intergovernmental bodies and processes.
- Participation of youth from developing countries, facilitated through the UN Youth Fund.

What are provisions of the pact on transforming global governance?

- The Pact resolved to make the multilateral system more effective, fit for the future, just and representative, inclusive and networked, and financially stable
- **UN Security Council Reform** - Commitment to increase the representation of developing countries, recognizing the special case of Africa.
- **Gender equality** - Revitalization of the Commission on the Status of Women.
- **Human Rights** - Ensure the enjoyment by all of all human rights, including through UN human rights mechanisms and protect human rights defenders.
- **International financial architecture** - Stronger participation of developing countries in international economic decision-making.
- Mobilization of more financing from multilateral development banks to help developing countries turbocharge their development needs.
- Review the sovereign debt architecture to ensure that developing countries can borrow sustainably to invest in their future.
- Strengthen global financial safety net to support countries in the event of financial and economic shocks, using special drawing rights.
- Delivering more finance to help countries address climate change and invest in adaptation and renewable energy
- **Outer Space Governance** - Strengthen the existing international frameworks to ensure that all countries can benefit from its safe and sustainable exploration and use.

What are the issues with the pact?

- **Not Unanimous** - Russia, Iran, North Korea, Belarus, Syria and Nicaragua rejected the pact demanding changes in national sovereignty and the role of external entities in domestic affairs.
- **No Means of Implementation** - Pact for the Future is packed with lofty goals and commitments but is thin on actual, realistic steps.
- The new pact does not spell out how the body plans to get members to follow its rules.
- **No UNSC reform** - The Summit did not agree to a clear pathway for Security Council reform and has called for categories of members.
- **Trust issue** - Effective global cooperation is increasingly critical to our survival but difficult to achieve in an atmosphere of mistrust.

- **Outdated Structures** - Using outdated structures that no longer reflect today’s political and economic realities , hampers the progress.
- **Dominance of G7** – Dominance of the developed countries in the provisions of the pact.
- No mention of how speeding up reforms the Global South has been demanding for years.

What lies ahead?

- Create clear procedure on implementing the aims and objectives.
- Make concrete targets to achieve in due time framework.
- Include the demands of Global South and reform of UNSC.

9.3 Asia Power Index

Why in News?

India has overtaken Japan to become the third most powerful country in Asia.

Power is the capacity of a state or territory to direct or influence the behaviour of other states, non-state actors, and the course of international events.

What is Asia Power Index (API)?

- **API** – The Index seeks to measure the ability of countries to shape and respond to their external environment and evaluates the power dynamics of countries across Asia.
- **Compiled by** - Lowy Institute, Australian think tank.
- **Index Components** - It measures the comprehensive power of 27 countries using a weighted average across eight thematic measures.
- **India** - India is a **middle power** in Asia.
- It ranked **3rd**, with an overall score of 39.1 out of 100.
- In 2024, India overtook Japan to become the third-most powerful country in Asia, increasing its score by 2.8 points.
- It performs best in the future resources measure, placing 3rd behind only the United States and China.
- India’s lowest-ranked measure is economic relationships, a result of the country sitting outside the regional economic integration agenda.
- India exerts less influence in the region than expected given its available resources.

Asia Power Index Components	
Resources	Influence
Economic Capability	Economic Relationship
Military Capability	Defence Networks
Resilience	Diplomatic Influence
Future Resources	Cultural Influence

COMPREHENSIVE POWER				
GROUPING	RANK	COUNTRY/TERRITORY	SCORE	
Superpowers ≥ 70 points	1	United States	81.7	
	2	China	72.7	
Middle powers ≥ 10 points	+1	3	India	39.1
	-1	4	Japan	38.9
	+1	5	Australia	31.9
	-1	6	Russia	31.1
		7	South Korea	31.0
		8	Singapore	26.4
		9	Indonesia	22.3
		10	Thailand	19.8
		11	Malaysia	19.6
		12	Vietnam	18.7
		13	New Zealand	16.3
	+1	14	Taiwan	16.0
	-1	15	Philippines	14.7
		16	Pakistan	14.6
		17	North Korea	11.3
Minor powers < 10 points	+1	19	Cambodia	9.5
	-1	20	Bangladesh	9.4
		21	Sri Lanka	7.7
	+1	22	Laos	7.0
	-1	23	Myanmar	6.7
		24	Mongolia	5.2
		25	Nepal	4.8
		26	Timor-Leste	4.3
	-1	27	Papua New Guinea	4.2

What are the driving factors of India?

- **Economic Growth** - India is one of the world’s fastest-growing major economies, driven by youthful workforce positioning India as a hub for innovation and investment.

- Programmes like “*Make in India*” and the push towards “*Atmanirbhar Bharat*” have enhanced its industrial and economic base.
- **Military Modernisation** - India's significant investment in modernising its military has elevated its strategic importance.
 - Advanced missile systems, nuclear capabilities, and an expanding naval presence, particularly in the Indian Ocean, have made India a central figure in regional security.
- **Diplomatic influence** – India's Participation in multilateral organisations such as the United Nations, G20, BRICS, and Quad has amplified its influence.
- India's strategic partnerships with the United States, Australia, Japan, and the European Union are also enhancing its presence in global affairs.
- **Technological and scientific advancements** - India's progress in space exploration, renewable energy, and information technology has cemented its position as a leader in emerging sectors.
 - Initiatives like *Digital India*, a booming start-up ecosystem, and advances in renewable energy capacity have enhanced India's standing as a technological powerhouse.
- **Cultural soft power** - India's rich cultural heritage, including *Bollywood*, *yoga*, and a vast diaspora, has contributed to its rising soft power globally.

What is India's potential to become Superpower?

- India's rise in the Asia Power Index highlights its potential to emerge as a global superpower.
- **Demographic dividend** - By 2030, India is projected to have the world's largest working-age population that will serve as a key engine for global development.
- **Strategic position in global politics** – India's role in regional security alliances, such as Quad, and its expanding partnerships with key global players underline its role in maintaining stability in the Indo-Pacific.
- **Economic development** - India's emphasis on economic self-reliance, combined with ongoing reforms in infrastructure, manufacturing, and technology would enhance its global standing.
- **Leadership in climate change** – India's efforts in climate change mitigation is positioning India as a leader among emerging economies in setting environmental standards and contributing to global climate goals.

What are the challenges for India becoming Super Power?

- Despite its impressive rise, India faces several significant challenges that could impact its global ambitions.
- **Income disparities** - While the economy continues to grow, significant income inequality persists, particularly in rural areas.
- **Infrastructure deficiency** - India will need to invest \$840 billion over the next 15 years to meet the needs of its fast-growing economy.
- **Geopolitical tensions** - India's complex neighbourhood, with ongoing tensions along its borders with China and Pakistan, poses a challenge to its regional stability.
- **Internal disturbances** – India's internal security issues like naxalism, insurgency affects India's position as global military power.
- **UN Security Council** - Permanent membership to UN Security Council is an important element of super power status and China will be a big challenge in attaining it.

What lies ahead?

- While challenges remain, the country's potential to shape the future of Asia and beyond is stronger than ever.
- To fully realise its potential, India must continue investing in its physical infrastructure, including transportation, healthcare, and education.
- Strengthen the neighbourhood relationships through regional organization and prevent the influence of China in the region.
- Utilize the vast diaspora of India across the globe to strengthen its soft power and diplomatic prowess.

G.S PAPER III

10. ECONOMY

10.1 Fintech Companies in Central Bank Digital Currency (CBDC)

Why in news?

Recently, some fintech companies showed interests to join the India's central bank's digital currency project.

What is E-Rupee / Central Bank Digital Currency?

- It is a digital currency issued by the RBI.
- **Need** – It was thought of as an alternative to cryptocurrencies which progressively lose their value.
- **Launch** - It was launched on a pilot basis in 2022.
- **Aim** - It is aimed at creating an additional option for using money.
- **Types** – CBDC Retail and CBDC Wholesale.
- **Features** – It is available entirely in electronic form and does not leave a computer network.
- It is a legal tender like banknotes that can be used for making transactions.
- It could be used for both person-to-person and person-to-merchant transactions.
- **Different from bank deposits** – Unlike bank deposits, digital rupee in users' wallets does not attract interest payments from bank.
- Deposits held in banks can be converted into digital rupees and vice versa for ease of use.
- **Importance** – It would bring greater transparency to transactions and lower the costs associated with the production of traditional fiat currencies.

Developments in India's Digital Payments	
2022	Digital Rupee
2016	Unified Payments Interface (UPI)
2012	National Automated Clearing House (NACH)
2011	Cheque Truncation System (CTS)
2010	Immediate Payment Service (IMPS)
2005	National Electronic Funds Transfer (NEFT)
2004	Real Time Gross Settlement (RTGS)
1990	Electronic Clearance Service (ECS)

Source: Reserve Bank of India | Infographics by Graphic Design Team, Polstrat



To know more about CBDC, click [here](#)

What are the trends of e-rupee in India?

- **Initial uptake** – At the time of launch, witnessed growing adoption, with transactions using the digital currency rising to over 1 million a day late last year.
- **Gradual decline** - since the initial uptake, its use has declined sharply to about 100,000-200,000 a day.
- **Reasons for decline** - RBI has stopped offering incentives to users and banks that participated in the pilot.
- Limited features and user base compared to a full-scale launch restrict widespread adoption.
- CBDC transaction is not enabled in UPI, which is the most popular digital transaction method.
- Future prospects - RBI is planning to enable the CBDC transactions offline without the need of internet and plans to introduce programmability in CBDC retail payments

Benefits of Programmability of CBDC

- It enables the CBDC to be used *for specified purposes*.
- It will permit users like, for instance, government agencies, to ensure that payments are made for defined benefits.
- Corporates will be able to programme specified expenditures like business travel for their employees
- Validity period or geographical areas within which CBDC may be used can also be programmed.

Why are fintech companies joining the e-rupee project?

- Initially, the RBI allowed only banks to offer e-rupee via their mobile apps but recently it has announced that payment firms could also offer e-rupee transactions once approved.
- **Need of RBI** – It has been looking to *increase the adoption base* for the digital rupee, and rollout on popular fintech platforms could be the push it needs.
- **Fintech's interest in e-rupee** – Fintech companies like PhonePe, Amazon Pay, Cred, and Mobikwik are looking to join by allowing their users to transact in e-rupee via Unified Payments Interface (UPI).
 - Fintech companies such as GooglePay, PhonePe, Amazon Pay, MobiKwik, and Cred currently account for *over 85% of digital payments via UPI*.
- **Impact of Fintech in CBDC** - It will enable payment transactions between users *beyond the registered banks* in the country.
- It *incentivizes private research* on central bank digital currency.
- It opens up *new platform for startups* to rise in financial services sector and can facilitate the invention of new financial products such as insurances, credit services to suit specific needs.
- It enables the Indian fintech companies to provide international services.
- It *enhances financial inclusion* by making financial services more accessible and promotes the digital economy of the country.

Fintech companies are the companies that offer financial services or applications that rely heavily on technology. They use technology to change how consumers interact with the financial industry.

What lies ahead?

- Launch the full-scale version and include more stake holders and users in the CBDC ecosystem.
- Find more use cases and release the additional features such as off line use, programmability.
- Allow offline capability to enable these transactions in areas with poor or limited Internet connectivity.
- Educate users about using CBDC and its benefits.
- Promote further research on digital currency ecosystem with upcoming technologies.
- Provide incentives to people and companies increase the adoption of e-Rupee.

10.2 Slowdown in Bank Deposit Growth

Why in News?

Latest data from the Reserve Bank of India (RBI) showed that deposits grew at a lower rate than the bank credit growth rate signifying higher loan-deposit ratio.

What is loan-deposit ratio?

- **Recent findings** – RBI data shows that Indian banking system has a high loan–deposit (LD) ratio of **about 77.2%**.
- **LDR** – It is the *ratio of the total amount of loans* given out by the bank *to the total amount of deposits* held by the bank.
- **Role** – It is used to *assess a bank's liquidity* by comparing a bank's total loans to its total deposits for the same period.
- It also helps to ensure that banks are not overexposed to risk.
- **Determining factors** - There are several factors like the *economy, interest rates, and the bank's lending policies*.

Deposits refers to which the customers keep with the bank and get interest for. **Credit** refers to which the bank lends to customers at an interest rate charged from them.

- For example, during an economic recession, banks may become more risk-averse and tighten their lending policies, resulting in a lower LDR.
- **Measurement** - It is measured and expressed as a percentage.
- **Impact of high LDR** – As the gap increases between deposits and credit, it creates an asset-liability mismatch for lenders.
- It may potentially expose the system to structural liquidity issues.

Lower LDR value	Higher LDR value
• It means the <u>bank may not be earning</u> as much as it could be.	• It means that the bank may <u>not have enough liquidity</u> to cover any unforeseen fund requirements.

What is the role of capital market in reducing bank deposits?

- **Outflow of household savings from banks** – Households and consumers who traditionally leaned on banks for investing their savings are increasingly turning to capital markets and other financial intermediaries.
 - While bank deposits continue to remain dominant as a percentage of financial assets owned by households, their share has been declining with households increasingly allocating their savings to mutual funds, insurance funds and pension funds.
- **Surge of capital markets** – After the Covid-19 pandemic, the Indian capital markets have seen a surge in retail activity through direct (direct trading) and indirect (using mutual fund route) channels.
 - **Economic Survey 2023-24** - The number of demat accounts with rose from 11.45 crore in FY23 to 15.14 crore in FY24 with respect to both depositories NSDL & CDSL.

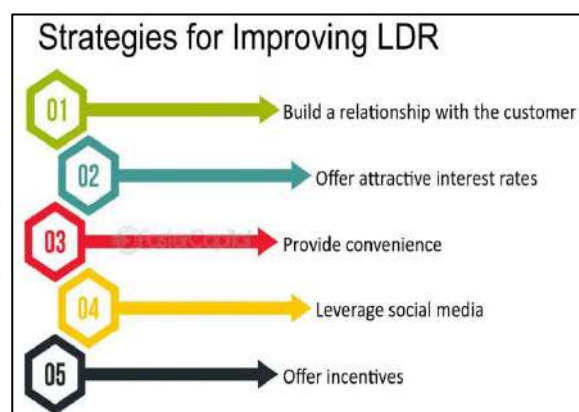
National Securities Depository Ltd (NSDL) is an Indian central securities depository, based in Mumbai. It was established in August 1996 as the first electronic securities depository in India.

Central Depository Services Ltd (CDSL) is the second Indian central securities depository based in Mumbai. It is the largest depository in India in terms of number of demat accounts opened.

- **Rise in retail participation** – It was steadier through the indirect channel via mutual funds.
 - The **net AuM (assets under management)** of the mutual fund industry grew by 6.23% as of July 2024.
- The mutual funds segment presently has about 9.33 crore systematic investment plan (SIP) accounts through which investors regularly invest in schemes.
- **Easier investment process** – Higher returns & robust digital infrastructure has eased investment process
- **Rapid smartphone penetration** – It have facilitated the entry of more retail investors into capital markets.

What are the measures taken?

- **Guidelines** – The lenders are advised to focus more on deposit mobilisation through innovative products.
- Banks are urged to garner more deposits by leveraging their wide network of branches.
- **Special retail deposit schemes** – It was launched by lenders such as State Bank of India, Bank of Baroda, Bank of India, Bank of Maharashtra, RBL Bank and Bandhan Banks.
- **Amrit Vrishti** - It was launched by SBI, a scheme that offers 7.25% interest on deposits for 444 days.
- **Monsoon Dhamaka** – It was launched by Bank of Baroda, a deposit scheme, offering interest rates of 7.25% for 399 days and 7.15% for 333 days.



What lies ahead?

- Banks can offer higher interest rates on deposits, launch promotional campaigns, and providing excellent customer service.
- Banks need to take the old-fashioned route to bring back focus on mobilising small deposits and not just big deposits to reverse the flagging deposit growth rate.
- Policymakers can also attempt to encourage savers to shift their investments from other asset classes to bank deposits.

10.3 Rising Gap between Low and High Skill jobs in India

Why in News?

A new World Bank report has highlighted the decline in low skill related jobs in India over the past decade.

What are Low and High Skilled jobs?

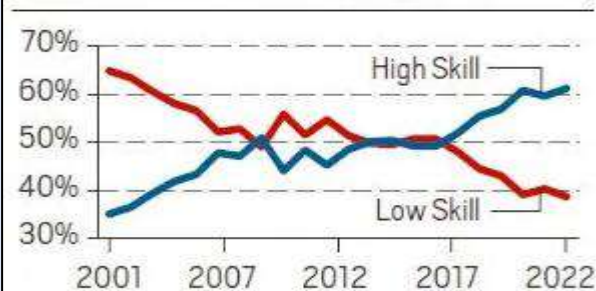
- **Low-skill labor** - It is characterized by routine tasks, limited skills, and lower educational attainment.
- They are often employed in low-paid and insecure jobs in manufacturing and other sectors such as clothing, footwear, and light manufacturing.
- **High-skill labor** - This type of labor is characterized by advanced technical, academic, and interpersonal skills.
- They often have skills like problem-solving, leadership, teamwork, and systems improvement.
- **Significance of low skilled jobs** - India's labor force is largely unskilled and about 80% of India's working-age population doesn't have a higher secondary education.

Status of Low and High Skill Gap in India

- India has *not made optimal use of its vast unskilled labour resource* to boost its low-skilled manufacturing base, compared to other countries such as Vietnam, Bangladesh and China.
- India *has missed USD 60 billion in export opportunity* in the low-skill manufacturing sectors such as textile and clothing.
- India's share in global low-skilled exports is *about 15% less* than its share of the global labor force.
- **OECD Trade in employment 2023** - High-skilled jobs generated through manufacturing exports are rising and trade-related low-skilled job opportunities are rapidly *moving to Vietnam and Bangladesh*.

INDIA'S HIGH & LOW SKILL-INTENSIVE MANUFACTURING

(% of total manufacturing exports)

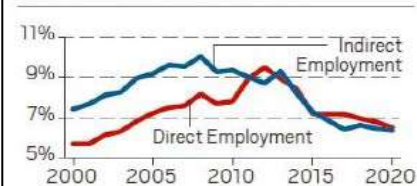


What are the reasons for the rising gap between low and high skilled jobs?

- **Decline in traditional industries**- Closure of Apparel & footwear industries affected the millions of low-skilled workers.
- **Stagnant manufacturing** – Share of Manufacturing in GDP *remains at around 14%* and well short of the targeted 25 %.
- This has exacerbated the divide between high-skilled and low-skilled jobs.
- **Dominance of service sectors** – India has emerged as a key market for multinational companies to establish data analytics and software development centres such as Global Capability Centres (GCCs).
- These sectors are less suited to absorbing large portions of the Indian workforce.
- **Weakening labour intensive jobs** – Increasing high-skill manufacturing in India's export basket affects the role of low skilled labour.
- **Global competition** – Bangladesh in textiles, Thailand in machinery, and Vietnam in electronics.
- **Reducing export-related jobs** - Direct employment linked to exports peaked at 9.5 % of total domestic employment in 2012 but fell to 6.5 per cent in 2020.
- **Declining participation in Global Value Chains** - Low participation in GVCs hampers the generation of sufficient trade-related jobs.
- **Declining international trade** - Tariff and non-tariff barriers have decreased India's international trade in goods and services.
- High Tariffs on Input Materials has raised production costs, making Indian producers less competitive in international markets.

JOBS CREATED BY EXPORTS-RELATED ACTIVITIES IN INDIA, 2000-2020

(% of domestic employment)



WTO Tariff Profile for 2022 indicates that India's average Most Favoured Nation (MFN) tariff increased to 18.1%, up from 17.6% in 2019.

What are the measures taken to address the gap?

- **Promoting Textile sector** - Seven PM Mega Integrated Textile Region and Apparel (*PM MITRA Parks*) has been planned to develop world-class textile sector infrastructure for a period up to 2027-28.
- **Development of Smart Cities** - *12 industrial smart cities* under the [National Industrial Corridor Development Programme](#) (NICDP) have been approved.
- **Skill Development** - [PM Vishwakarma](#) scheme has been launched to encourage and develop the capacity of artisans.
- **Financial Support**– Under [Pradhan Mantri MUDRA Yojana](#), institutional credit up to 20 lakh is provided to support MSME industries.
- **Tariff reduction** – In FY25 Union Budget, import tariff on various items, including medical equipment, mobile phones and related parts, critical minerals, and telecom equipment has been reduced.

What lies ahead?

- Simplify international trade procedures to improve participation.
- Reduce tariff to eliminate disparities and to lower costs for imported intermediate inputs.
- Create employment opportunities in the non-farm sector to accommodate the growing workforce.

Quick Facts

- **Global Capability Centres (GCCs)** - GCCs are offshore facilities that multinational corporations (MNCs) establish to manage business functions and processes for their parent organizations.
- They are also called Global In-house Centers (GICs).
- They are often located in places with a lot of talent, and they use collaborative teams to create value and intellectual property.
- Leading companies from across the sectors have established major headquarters in India to manage core functions including design, inventory, supply chain management, and transportation through GCC.

10.4 Relative Economic Performance of Indian States

Why in news?

Recently, Economic Advisory Council to the Prime Minister (EAC-PM) has released the paper ‘Relative Economic Performance of Indian States: 1960-61 to 2023-24’.

How has the regional growth changed from 1960 to 2023?

- In the 1960s, five states, Uttar Pradesh, Maharashtra, West Bengal, Tamil Nadu and Bihar, accounted for about 54% of India’s GDP.
- **Interregional Disparities** - *Western and Southern regions of India have performed* notably better than other parts of the country from 1960-61 to 2023-24.
- **Intraregional Disparities** – Within each region, disparities have emerged amongst the States.
- Maharashtra, Gujarat, Delhi and Haryana have shown steady performance over the last six decades.

Rank	State	Share in India’s GDP
1	Uttar Pradesh	14.4
2	Maharashtra	12.5
3	West Bengal	10.5
4	Tamil Nadu	8.7
5	Bihar	7.8

Regional Growth (1960-2023)

Southern Region

- **States** - Karnataka, Andhra Pradesh, Telangana, Kerala and Tamil Nadu.
- Since the economic liberalization of 1991, they have emerged as the leading performers and now collectively account for *approximately 30% of India’s GDP* in 2023-24.
- **Kerala** - Only southern state which saw its share in the GDP dip.
- Its share increased from 3.4 % in 1960-61 to a peak of 4.1 % in 2000-01, then dipped to 3.8 per cent in 2023-24.

Western Region	<ul style="list-style-type: none"> • Maharashtra and Gujarat – Their <i>per capita incomes remained above the <u>national</u></i> average since the 1960s. • Goa – Its relative per capita income has doubled over the period.
Eastern Region	<ul style="list-style-type: none"> • West Bengal – It was the third-largest in 1960-61 and now has <i>declined a little</i> in 2023-24. • Odisha – Its relative per capita income <i>increased</i> in 2023-24 than in 2000-01. • Bihar – Its relative position has <i>stabilized in the last two decades</i> but it remains significantly behind other states.
Northern Region	<ul style="list-style-type: none"> • Delhi - It had the highest per capita income in 1960-61 it increased further in 2023-24 which is at <i>250.8% than national average</i>. • Punjab – Its per capita income is 106.7 % of the national average in 2023-24, <i>down</i> from 1960-61 level. • Haryana – Its relative per capita income <i>increased</i> in 2023-24 than 1960-61 levels.
Central Region	<ul style="list-style-type: none"> • Uttar Pradesh - In the 1960s, it was largest economic powerhouse in the country with a share of 14.4 % in India's GDP. • Madhya Pradesh - Its relative per capita income has <i>risen since 2010</i>, following a five-decade period of decline since 1960s.

What are the causes of regional disparities?

- **Historical Factor** - Three presidency towns—Bombay, Calcutta, and Madras—were home to the largest industrial clusters in the country.
- **Green Revolution** - *Punjab and Haryana gained* rise in income levels by green revolution of 1960s.
- *Punjab did not keep pace* with the national average & its economic trajectory diverged completely from Haryana.
- **Economic Liberalization** - Since this, *southern States have emerged as the leading performers*
- **State Reorganization** – Bifurcation of states had *reduced the resources available* to them and their collective share to the national growth.
- **Policies** – State-specific policies on socio economic spheres and Performance of individual States in response to changes in national policies.

What lies ahead?

- Create policies that are tailored to the needs of different regions and that promote equality of opportunity.
- Provide fiscal support to lagging regions and ease worker relocation.
- Improve the quality of education and training to help people adapt to changing job markets.
- Decentralize industries to encourage balanced regional development.
- Promote local economies so that all regions benefit from economic activity.
- Improve connectivity through transport links.

Quick Facts

- **State share in national GDP** - It is defined as ratio of state's Gross State Domestic Product (GSDP) to sum of GSDP of all states.
- This gives an idea of relative economic importance of states.
- **Relative per capita income** - It is defined as percentage of per capita Net State Domestic Product (NSDP) of the state to the all-India per capita Net National Product (NNP) or per capita Net National Income (NNI).

10.5 Financial Sector Self-Regulatory Organizations (SRO)

Why in News?

In August, the Reserve Bank of India (RBI) recognised the Fintech Association for Consumer Empowerment (FACE) as a self-regulatory organisation (SRO) in the financial technology (fintech) sector.

What is a self-regulatory organisation (SRO)?

- **Self-Regulatory Organizations (SRO)** - These are usually *non-governmental organizations*, established to regulate certain professions or industries to promote order among businesses and organizations.
- They act as a *bridge between industry players and the regulator*.
- SROs accomplish control through internal mechanisms that regulate the flow of business operations.
- **Functions of SROs**
 - To represent all stakeholders
 - Set standards and best practices
 - Collect data, monitor and report violations
 - Address grievances, resolve disputes
 - Raise customer awareness and protect them
 - Support research and development
 - Complement existing regulatory and supervisory arrangements
 - Establishing and enforcing regulatory standards
 - Promoting ethical behaviour and market integrity
 - Fostering transparency and accountability among members
- **FinTech SRO (SRO FT)** - They have membership from fintech's currently regulated by the RBI, including non-banking financial companies-account aggregators (NBFC-AA), NBFC-peer-to-peer (P2P) lending platforms, among others, *excluding banks*.
- **Regulations of SRO** - RBI recognizes SRO in banking and fintech sector and SEBI in the capital market sector.

SROs regulated by SEBI

- **Association of Merchant Bankers of India (AMBI)** – It is to set up professional standards for providing efficient services and establish standard practices in merchant banking and financial services.
- **Association of Mutual Funds of India (AMFI)** - It is the SRO of mutual funds organizations.
- **Registrars Association of India (RAIN)** - It is a SRO for registrars to an issue and share transfer agents has been set up.

SROs regulated by RBI

- **Foreign Exchange Dealers' Association of India (FEDAI)** –It was formed as an association of banks dealing in foreign exchange and is incorporated under Section 25 of the Companies Act, 1956.
- **Fintech Association for Consumer Empowerment (FACE)** - It is a self-regulatory organisation (SRO) in the financial technology (fintech) sector.
- **Sa-Dhan** - It is an association of Microfinance and Impact Finance Institutions.

What are the benefits?

- **Facilitate open communication** - Through regular consultations, feedback, and policy dialogues, the SROs facilitate open communication and help fintech's remain informed about regulatory expectations.
- **Expertise** – SROs are widely considered experts in their fields and, therefore, know a great deal about the markets they work in.
- **Higher standard of conduct** – With the establishment of SROs, member organizations follow a certain standard of conduct that helps promote ethical ways of doing business.
- **Boost confidence** – High standard of conduct can lead to investors and consumers becoming more confident in the market.
- **Saves public money** – Instead of tax money, they are funded by the organizations that are under its wings.

- Therefore, the government is able to save by foregoing the need to maintain an agency for such a purpose.

What are the challenges?

- **On boarding** – There is initial low momentum in onboarding members under the self-regulatory bodies.
- There has not been any SRO for the banking system and most of them functions as mere associations.
- **Heterogeneous entities** - Since NBFC sector is heterogeneous, limiting the number of SROs to two will affect their effectiveness.
- **Big entities** - The most influential technology companies such as Alphabet (Google), Apple, Meta (Facebook), Amazon and Microsoft offer various financial and non-financial services.
- There is lack of guidelines about their inclusion under the SROs.
- **Diverse functions** - Many entities are involved both in lending and payments and are directly regulated for certain activities, but indirectly regulated for others.
- The coverage of these entities under an SRO poses challenges.
- **Uncertainty in roles** - There is a lack of clarity on the roles of fintech's that are associated with lending and payments companies.

Way forward?

- Encourage and incentivise entities to get registered under self-regulatory organizations.
- Set up SROs for different segments, based on the principal activities and the chain of entities involved.
- Treat regulated and unregulated entities differently.
- Avoid overlap for the effective implementation of the SRO regime.

Quick Facts

- **Indian Banks' Association (IBA)** – It was established in 1946 as an interface between banks, the RBI, and the government.
- **Association of Small Finance Banks of India**- It is a body representing small finance banks.
- **Finance Industry Development Council** – It was established in 2004 and represents NBFCs, particularly those involved in lending.
- All the above *are not an SRO*.

10.6 National Credit Framework (NCrF)

Why in News?

The University Grants Commission (UGC) has issued new Standard Operating Procedures (SOPs) for the implementation of the National Credit Framework (NCrF).

What is National Credit Framework (NCrF)?

- **NCrF** - It an inclusive one single Meta framework to seamlessly *integrate the credits earned* through school education, higher education and vocational & skill education.
- It provides for Assignment, Accumulation, Storage, Transfer & Redemption of Credits
- **Integrated Framework** - It encompass National Higher Education Qualification Framework (NHEQF), National Skills Qualification Framework (NSQF) and National Curriculum Framework (NCF).
- **Jointly developed by** - UGC, AICTE, NCVET, NIOS, CBSE, NCERT, Ministry of Education and Ministry of Skill Development.
- **Notional Learning Hours** - For one year of learning across school, higher & vocational education, training and skilling, the leaning hours is to be set at 1200 Hrs per year and awarded 40 Credits per year.
- **Credit Value** - Under NCrF, one Credit is equivalent to 30 notional learning hours.
- **Credit Activities** – Student can earn credits from diverse activities
 - Classroom teaching, assignments, tutorial
 - Laboratory work, Atal Tinkering Laboratories, Research projects

- Sports and games, yoga, performing arts, music, handicrafts
 - Social work, National Cadet Corps, National Service Scheme activities,
 - Vocational and skill education
 - On-the-job training, internships, apprenticeships
- **Mandatory Assessment** – It is applicable for earning credits for all types of learning.
 - **NCrF credit levels**
 - School education - Up to level 4
 - Higher education - Level 4.5. to level
 - Vocational education & training from - Level 1 to level 8.
 - The total Credit Points earned by the student in a particular year could be obtained by multiplying the credits earned with the NCrF Level at which the credits have been earned.
 - **Recognition of Prior Learning**- It enables provisions for RPL for students and workers which credit their learning through various formal, non-formal, traditional or any other means.
 - **Academic Bank of Credits (ABC)** - It would be operationalised through ABC by including credits earned through school, vocational and higher education, training and skilling, including apprenticeships, internships, project work etc.

Academic Bank of Credits (ABC) is a virtual/digital storehouse that contains the information of the credits earned by individual students throughout their learning journey.

What are the benefits of NCrF?

- It is an enabling framework rather than a regulatory one.
- **Multidisciplinary Credit Transfer** - Using the NCrF, higher education institutions (HEI) can give a unified accumulation and transfer of credits across multidisciplinary education, including skill education.
- **Balanced Education** – It helps HEIs balance vocational, skilling & knowledge-generating academic pursuits.
- **Flexible Credit Earning** - It gives students the flexibility to earn credits from diverse range of activities.
- **Meeting Diversity of Needs** – It understands India's societal, technological, and educational needs and strive to meet those demands holistically.
- **Making Education Dynamic**– It helps in making India's higher education system dynamic and relevant to the country's needs.
- **Creating Competitive Institutions** - It aims to help institutions remain flexible and competitive in keeping with the inevitable rapid economic and technological changes.
- **Fulfilling Employment Needs** – It enables institutions and students to meet the current and future evolution of job requirements by bridging the skill mismatch.
- **Career Growth** – It allow students to pursue their academic and career goals.
- **Upgrading HEIs** – It transform HEIs, besides being havens of knowledge, to equip students with the skills and the competencies needed for emerging roles and self-employment.
- **Creating MERU Institutions** – It enables the transformation of HEIs into multidisciplinary education and research university (MERU) institutions as demanded by NEP 2020.
- **Facilitating Social Mobility** – It makes higher education a tool for students to increase their social mobility by enabling students acquire practical skills and knowledge through a flexible curriculum.
- **Multiple Entry and Multiple Exit**- It enables the students with opportunities to catch up and re-enter education ecosystem in case they have fallen behind or dropped out at any stage.

What are the challenges in implementation?

- **Manpower** - Mapping course credits of individual students who take a transfer from other educational institutes needs substantial manpower.
- **Homogenization** - A common framework for courses risks homogenising of institutions' and erasing the uniqueness of them.
- **Scaling issues** -Scaling this individualised mapping could become problematic as student numbers increase.

- **Mapping credits** - Understand a student's prior learning and mapping it with a particular university's courses poses implementation difficulties.
- **Possibilities of rejection** – Universities may accept or reject the credits earned by the learner through prior learning.
- **Standards of learning** – Standards of teaching and learning across institutions vary and accommodating the differences into the framework poses challenges.

Way forward?

- Use of Information Technologies to integrate the educational reporting systems.
- Accommodate the diverse education models across the states.
- If a university does not accept a student's credits, it needs to inform him/her why the credits are not accepted.
- Raise awareness among students and address challenges in understanding the framework.

10.7 India's Growth Trajectory

Why in News?

Recently Ministry of Information & Broadcasting has released a multi-sectoral overview of Indian Economy.

What was the performance of Financial Markets?

- **Financial markets** - They show unprecedented expansion, capturing the attention of global investors.
- Growth potential of India is intricately linked to its liquidity and valuation dynamics.
- **Stock Market Growth** - With the *world's 4th largest stock market*, daily average cash-trading levels of India has surged threefold from pre-Covid levels.
- **Foreign Investments Performance** – The retail sector's buying spree, fuelled by high liquidity, is expected to invite further foreign investments.
- **Foreign Portfolio Investment (FPI)** - Although FPI inflows have experienced a recent slowdown, India's high-yielding markets and robust growth potential continue to attract significant interest.
- In the fiscal year 2023-24, foreign portfolio investments *amounted to Rs.3,39,066 crore*.
 - Significance - This influx of capital underlines the resilience and attractiveness of India's financial landscape.
- **Booming IPO Market** - The number of *initial public offerings (IPOs) rose by 66% in FY24*, from 164 in FY23 to 272 in FY24, reinforcing India's growing significance within the global financial ecosystem.
- **Market to Partner** - MNCs are increasingly seeking partnerships with local firms, recognizing the strategic value of collaboration in India's unique business environment.



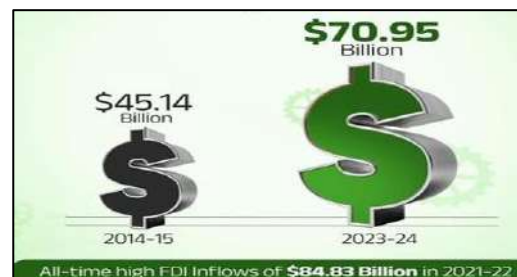
What was the performance of Manufacturing and Services sector?

- India is not only the world's service economy but is increasingly becoming a major player in global manufacturing.
- **Preferred Investment Destination** - Government initiatives aimed at strengthening domestic production capabilities and attracting foreign direct investment (FDI). Have positioned India as a preferred destination for companies looking to diversify their global supply chains.



- **Global Manufacturing Hub** - Make in India initiative has transformed India into a global manufacturing hub by enhancing industrial capabilities, fostering innovation, and creating world-class infrastructure.
- **PLI Schemes** - PLI Schemes were introduced in **14 key sectors** aimed at fostering investment in cutting-edge technology and promoting global competitiveness and to boost the country's manufacturing capabilities, enhance exports.
- **FDI Flow** - In FY 2023-24, total FDI inflows reached **\$70.95 billion**, with equity inflows at \$44.42 billion.
- **Improved Ease of Doing Business (EoDB)** - India improved its business environment, climbing from 142nd in 2014 to **63rd** in the World Bank's Doing Business Report (DBR) 2020.
- It reflects the government's sustained efforts to simplify regulations, reduce bureaucratic hurdles, and create a more business-friendly landscape.
- **Service Sector Growth** - India's dominance in areas such as information technology (IT), cloud computing, and data science has solidified its reputation as a global hub for knowledge-based services.

Production Linked Incentive (PLI) is a form of performance-linked incentive to give companies incentives on incremental sales from products manufactured in domestic units.



How was the performance of Digital India and Technological Innovation?

- India's digital economy is one of the fastest-growing in the world, significantly reshaping the nation's technological landscape.
- **Effect of Digital India initiative** – It has increased the internet penetration and boosted the digital infrastructure across the country.
- Internet subscribers has risen to 95.4 crore in March 2024.
- **Growth in Digital Payments** - Digital payments have surged exponentially, driven by the innovative Unified Payments Interface (UPI) platform.
- Currently, 46% of global real-time payment transactions occur in India & UPI processed nearly Rs.81 lakh crore between April and July 2024 alone.
- The integration of digital technologies into various sectors, including agriculture, healthcare, and education, has enhanced efficiency and improved service delivery across the board.
- **Digital Investment Drivers** - India's rapid advancements in artificial intelligence (AI), blockchain, and data science are driving economic growth and attracting global investments.
- **IndiaAI Mission** - It is aimed at building a robust AI ecosystem by democratizing computing access, enhancing data quality, and fostering indigenous AI capabilities.
- IndiaAI Compute Capacity, IndiaAI Innovation Centre, and AI Startup Financing set to propel AI innovation over the next five years.



What is the potential of demographic dividend and geopolitical positioning?

- **Demographic Dividend** - 65% of India's fast-growing population is under 35 and this workforce can be leveraged for next 3 decades.
- **Government Initiatives to harness demographic dividend**
 - Pradhan Mantri Kaushal Vikas Yojana
 - Craftsmen Training Scheme
 - Jan Shikshan Sansthan
 - National Apprenticeship Promotion Scheme
- **India's Geopolitical positioning** – It has emerged as a key factor in its growth trajectory.
- **South Asian Power** – Its role as a stabilizing force in South Asia and increasing engagement with major global powers has enhanced its strategic importance.
- **Influence in Multilateral Forums** - India's participation in multilateral forums such as the G20, Quad, and BRICS further strengthens its voice on global issues ranging from climate change to global security.

- This geopolitical stability, coupled with economic reforms, makes India an attractive destination for foreign investors.
- **G20 Presidency** - India's approach as G20 president was characterized by inclusivity, ambition, action-orientation, and decisiveness.
- These principles were reflected in the New Delhi Leaders' Declaration, which was unanimously adopted by all G20 members.

11. AGRICULTURE

11.1 Karnataka Soil Crisis

Why in News?

Recent data from the Karnataka's Agriculture Department revealed that more than half of Karnataka's agricultural land suffers from low levels of soil organic carbon (SOC).

What is the status of soil health in Karnataka?

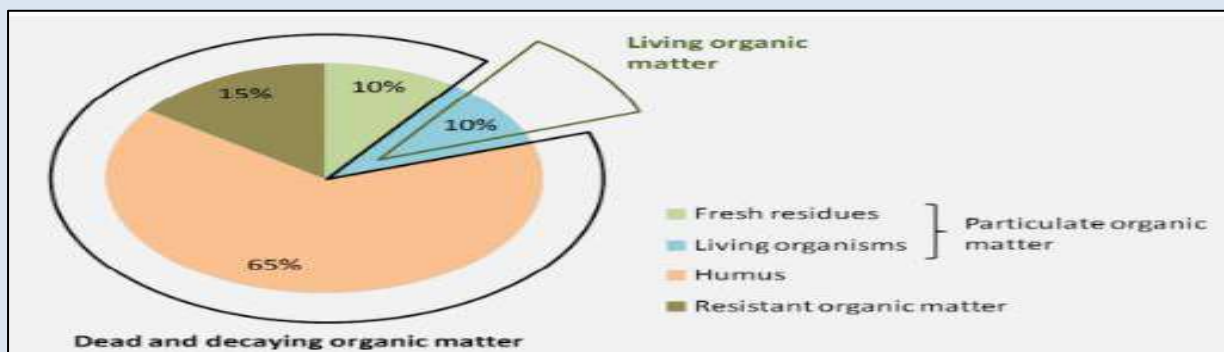
- **Fertilizer high usage districts** – Districts like Kolar shows that over 94% of its farmland recording *low organic carbon levels*.
- **Soil crisis** – Recent analysis shows that, between 2017 and 2024, more than 50% of Karnataka's farmland falls ***below the necessary SOC threshold of 0.5%***.
- It signals towards *widespread soil degradation*.
- **Organic manure usage districts** - Districts such as Dakshina Kannada, Uttara Kannada and Udupi, which boast more tree cover and traditional farming practices, exhibit healthier soil conditions.
- This belt is formed along the coast due to the deposition of alluvium and sediments carried by the rivers & sea waves.
- The soil here consists of sand and clay which is very rich in organic nutrients.
- Here, cropping pattern, practices and yield have remained constant.
- Even though few thousand acres are being diverted for plantation crops, the cultivators ensure not to use chemical fertilisers but practice mulching and other bio-friendly methods.

What is Soil Organic Carbon (SOC)?

- **SOC** - It is a measurable component of soil organic matter.
- SOC refers only to the carbon component of organic compounds.
- **Measurement** – It is difficult to measure directly, so laboratories tend to measure and report SOC.
- **Backbone of soil quality** - It plays a vital role in water retention, nutrient availability, pH buffering and preventing soil erosion.
- **Foundation for sustainable agriculture** – Optimal SOC levels ensures in maintaining healthy and productive soils.
- **Significance** - Sequestering carbon in SOC has been suggested as one way to mitigate climate change by reducing atmospheric carbon dioxide.

Organic Matter

- It makes up just 2–10% of most soil's mass.
- **Composition** – It is composed mainly of carbon, hydrogen and oxygen.
- It has small amounts of other elements, such as nitrogen, phosphorous, sulfur, potassium, calcium and magnesium contained in organic residues.
- **Components** – It is divided into '*living*' and '*dead*' components and can range from very recent inputs, such as stubble, to largely decayed materials that might be many hundreds of years old.
- About 10% of below-ground SOM, such as roots, fauna and microorganisms, is 'living'.



- **Importance** – It contributes to nutrient retention and turnover, soil structure, moisture retention and availability, degradation of pollutants, and carbon sequestration.
- It has a greater role in the physical, chemical and biological function of agricultural soils.

What are reasons for SOC depletion in Karnataka?

- **Heavy use of fertilizers** - Karnataka ranks *amongst the top five states* in fertiliser consumption.
- Their usage per hectare *surpassing the national average*.
 - In the 2020-21 and 2021-22, fertiliser use skyrocketed to over 45 lakh metric tonnes.
- **Reduction in livestock population** – It fell from 1.48 crore in 2007 to 1.14 crore in 2019.
- **Rising costs cattle manure** – It costs approximately Rs 14,000 per acre compared to Rs 3,000 for chemical fertilisers, which have pushed farmers to rely heavily on the synthetic alternatives.
- **Logistical challenges** – There is a *shortage in supply of mulching agents* every season from the sources as it is not economical to transport the mulching material over 100 kilometres.
 - Apart from cattle manure, they mulch coconut, areca leaves and forest wastes onto the fields.
- All these interconnected factors led to *decline in the application of organic manure* and increase of synthetic fertilizers.

What are its impacts?

- The impact of declining SOC is *not uniform* across Karnataka.
- **Reduce soil fertility** – Low SOC levels are directly linked to reduced soil fertility.
- **Increase vulnerability** – Such soils are *prone to erosion and water runoff*, compounding the impact of climate change on local agriculture.
- **Lowers crop yields** – Decreased soil nutrients and soil quality reduce the crop yields and also affects the crop health.
- North and central Karnataka are experiencing a marginal lowering of yields and the quality of the yield in various crops such as oil seeds, cotton, groundnut, jowar, maize and millets.
- **Creates a vicious cycle of environmental degradation** – SOC depletion along with monocropping and deforestation which are common practices in the state, further strip the soil of its natural nutrients.

The districts that have black alluvial soil are the worst affected, namely in the northern parts of the state, which are locally called 'Eremannu'. These are derived from the weathering of basalt rocks.

What are the measures taken by Karnataka government?

- **Soil testing** – They had launched one of the biggest-ever plans to collect and analyse soil conditions in over 500,000 soil samples on over 30,000 hectares in different parts of the state.
- **Distributing manures** – Efforts are underway to increase the distribution of green manure seeds and enhance soil testing capabilities.
- Both of the above projects will begin and end in the year 2024.
- **Tracking soil health** - A dedicated mobile phone app to offer farmers real-time access to soil test results and recommendations.
- It will allow farmers to adopt appropriate soil conservation measures easily and encourage in taking up mulching in an extensive way.

What lies ahead?

- Use green manure, vermicompost and practices such as mulching post-harvest crop residue on the field can play a significant role in rejuvenating the soil.
- Integrate organic and inorganic fertilisers to strike a balance between productivity and soil health.
- Farmers can install their own shredding machines for converting the biomaterial into mulching agents.

12. ENVIRONMENT

12.1 Sustainable Management of Invasive Species

Why in News?

Herbicide treatments designed to cull invasive plants have affected butterfly populations by unintentionally killing off native plants.

What are Introduced Species?

- **Introduced Species** – These are *non-native species* that are introduced into places outside their natural range.
- Non-native species can have various effects on the local ecosystem and not all non-native species are invasive.
- **Naturalization** - Some introduced species adapt to the introduced environment and thrive well better than the native species.
- **Invasive species** – The introduced species become invasive when it spreads beyond the introduced region and threatens the native ecosystem.
- In the case of plants, invasiveness refers to a plant's ability to dominate and overtake other plants, or cause other ecological or economic harm.
- **Impacts of invasive species** - The role of introduced plants in ecological communities is complex.

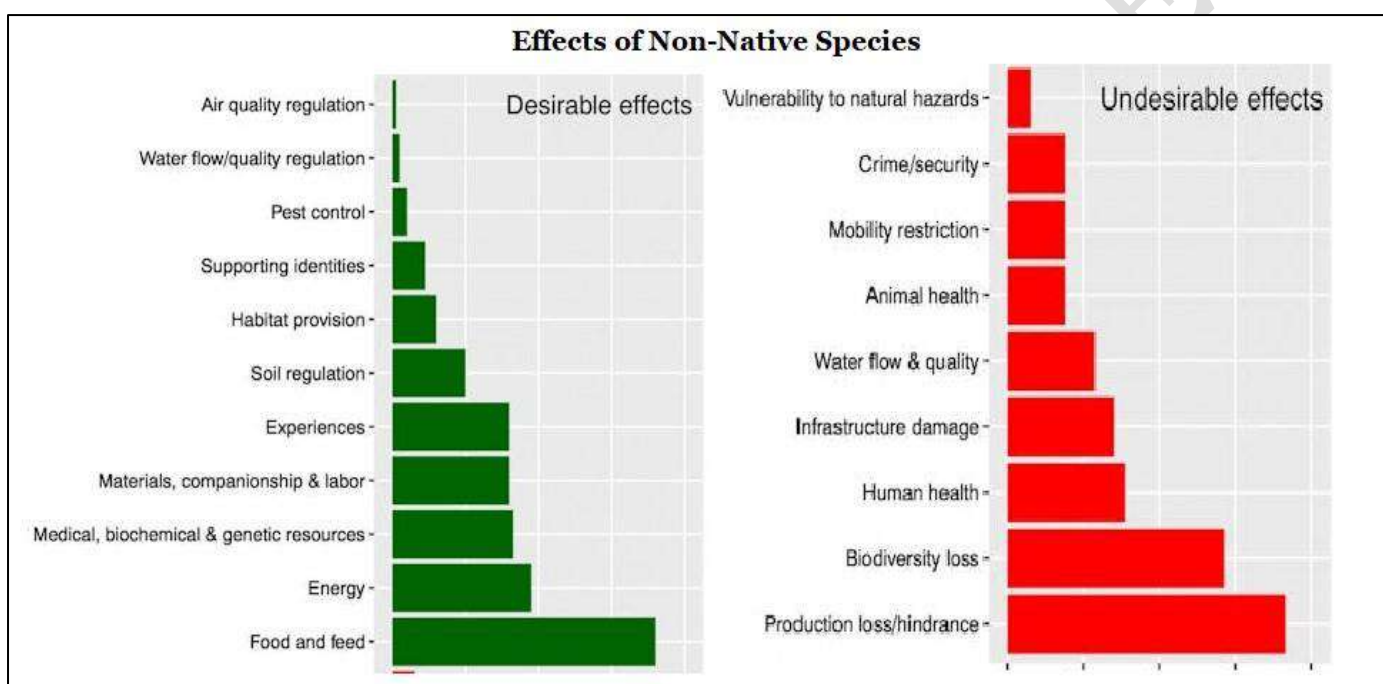
To know more about Invasive species and their negative impacts click [here](#).

What are the benefits of invasive species?

- Some introduced species have been vital in the fight against biodiversity loss, control of invasive species and adaptation to climate change.
- **Ecosystem Resilience** - Introduced species can play positively in maintaining ecosystem resiliency.
- **Aid Local System** - Some invasive species can aid local ecosystems by helping to filter the air and water of contaminants.
- **New Ecological Roles** - Introduced plants often differ in their characteristics from native plants, meaning they can provide new roles or replace the roles formerly served by native plants.
- **Ensure continuity of ecosystem** - Introduced plants could be well-placed to support, or even buffer, current ecosystems as they undergo transitions due to climate change.
- When native species are unable to withstand the climate change, invasive species can fulfil their role in the ecosystem.
 - *Siberian elm has adapted well to river areas* that are now too dry for native elms and contribute similar roles of latter in the community, like photosynthesis and providing wildlife habitats.
- **Drought Tolerant** - Some introduced species can be more drought-tolerant than native species to adapt to human-modified climate extremes.
- **Carbon Sequestration** - Introduced species can be used to increase carbon sequestration.
- **Positive Competition** - The introduced *humulus japonicus vine in river habitats in southern France* reduced vine diversity but increased the height of the plants, resulting in more photosynthesis.
- **Increase Agri Productivity** - *Earthworms are non-native in most of the Midwest*, but they can increase agricultural productivity by 25%.

What are the negative impacts of unsustainable control efforts?

- While invasive species control measures are crucial to protect ecosystems and biodiversity, they can sometimes have unintended negative consequences.
- **Non-Target Species Harm** - Control methods, such as herbicides or pesticides, can unintentionally harm native species.
 - For example, herbicides might kill off beneficial plants along with the invasive species.
- **Ecosystem Disruption** - Aggressive control measures, like clearing large areas of habitat, can disrupt the intricate balance of ecosystems.
- **Evolutionary Responses** - Invasive species can evolve resistance to control measures, making them harder to eradicate in the future.
- **Economic Costs** - Control measures can be expensive, especially for large-scale infestations. This can strain resources and divert funds from other conservation efforts.
- **Social Impacts** - Control measures may affect local communities, especially those that rely on natural resources for their livelihoods.
- For example, herbicide use in agricultural areas might impact farmers' income.



Way forward?

- Introduced plants are already highly adapted to local habitats, making their eradication challenging and perhaps even counter-productive to overall ecosystem health.
- Conduct regular study, monitoring of introduced pieces and create a holistic ecosystem-wide viewpoint to prioritize management of introduced plants.
- Organize and prioritize the management and restoration of habitats based on the net benefit (or harm) of a species to an ecological community, instead of on the origin of the species.
- Consider the potential ramifications of the removal process of introduced species on the community.

12.2 Nationally Determined Contributions (NDC)

Why in News?

The Net-Zero Tracker group, which assesses the global climate commitments, found with 93% of global GDP covered by targets the world is on the road to net zero.

What are Nationally Determined Contributions (NDC)?

- **NDC** – These are *voluntary commitments by countries* to reduce their greenhouse gas emissions as part of climate change mitigation and achieve Paris agreement.

- The commitments were made under the United Nations Framework Convention on Climate Change (UNFCCC) during UN Climate Change [Conference of Parties](#) (UN Climate Action Summit)
- **Periodic Update** - Countries periodically report on their plans and progress in bringing down national levels of planet-warming carbon emissions.
- It was *updated every five years till 2021* U.N. climate summit, COP26, in Glasgow after which it will be updated every *couple of years*.
- The next round of NDC updates is due in February 2025.
- **Paris Agreement** - Countries agreed under the 2015 UNFCCC Paris Agreement to work together in limiting global warming to *within 2 degrees Celsius of pre-industrial temperatures*.
- **Voluntary** - Pledges made within an NDC are considered voluntary, with countries facing no legal penalty if they fail to meet their own goals.
- **Obligation** - Countries are obligated under the Paris Agreement to monitor progress and report on any failures.
- **Global Stocktake** - It is a fundamental component of the Paris Agreement which is used to monitor the implementation and evaluate the collective progress made in achieving the agreed goals.

NDC Commitments of India		
Commitments	Old NDC	Updated NDC
Reduction in emission intensity of GDP below the 2005 level, by 2030.	33-35%	45%
Non fossil fuel-based energy out of Total Energy	40%	50%
Renewable Energy	500GW	500GW
Creation of Carbon Sink through additional forest and tree cover by 2030.	2.5 to 3 billion tonnes of CO ₂	Additional 1 billion Tonne.
Achieving net NetZero		By 2070

Why NDCs are important?

- **Control Climate Change** – NDCs helps in mitigation and adaptation of climate change at global level.
- **Shared Emission Targets** - Paris Agreement sets shared global emissions targets and enables each country to decide on achieving it.
- **Aligned Policy Making** – They help in making the environmental and economic policies of a country.
- **International Coordination** - The NDC reports help countries coordinate their climate policies action with one another.
- **Monitoring** – Tracking the progress of the countries and the world as whole towards address climate change.
- **Attract Funding** - Countries with more developed NDCs that outline projects, policies and financing needs get international climate financing without difficulty.
- **Addressing backlogs** - NDC reports can also describe backsliding on climate-friendly policy.

What are the challenges in meeting NDCs?

- **Coordination challenges** – Difficulties in establishing a mandate for coordinating actions around NDCs and driving their implementation.
- **Inadequate resources** – Achieving the NDC commitments requires huge monetary, material and technological resources.
- **Non developed countries** – Least developed countries (LDC) and developing countries though have the will, are at disadvantaged position in meeting the NDC target.

More than 170 of the world's countries met the last NDC deadline ahead of COP26 in early 2021.

- **Inadequate Support from Developed countries** – They are hesitant to provide financial and technical support to LDC and developing countries.
- **Dependency on Fossil Fuels** - Many countries rely heavily on fossil fuels, transitioning to cleaner energy sources can be technologically challenging and expensive.
- **Inadequate Infrastructure** - Developing countries often lack the necessary infrastructure (e.g., power grids, transportation networks) to support renewable energy and other climate-friendly technologies.

How can the NDC reporting can be improved?

- Cut emissions roughly in half from 2005 levels within the next six years to achieve the Paris goal.
- Improve NDC by making it more detailed, ambitious, and credible.
- Take in the emissions reductions targets for key polluting sectors, such as energy and transportation in the NDC.
- Include adaptation plans to the conditions of a warmer world and keep people safe from increased flooding, heatwaves and other climate extremes.
- Add in the NDC details of the projects to be launched, plans for creating jobs in clean technology industries and plans for public health measure amid increasing temperatures.
- Incorporate NDCs into national law, making their climate commitments legally binding at a national level.

What lies ahead?

- Reconcile national policies with progress in transitioning to clean energy, such as fossil fuel subsidies.
- Make provision to enable a country to monitor its progress toward its NDC pledges.

Quick Facts

Paris Agreement

- It is a legally binding international climate treaty, approved by world leaders attending the United Nations Climate Change Conference, COP21 in 2015.
- **Adopted** - December 12, 2015 by 196 countries
- **Entered into force** - November 4, 2016.
- **Main Goal** - To limit global warming by keeping average global temperatures “well below two, preferably to 1.5 degrees Celsius”, in comparison with pre-industrial levels.
- Green Climate Fund was set up as part of the Paris Agreement.
- It is the world’s largest climate fund.
- It helps developing countries achieve their NDCs and work towards lowering emissions, with the hope of eventually averting the climate emergency.

13. SCIENCE & TECHNOLOGY

13.1 Extremophile bacteria

Why in news?

The recent research studies shows that extremophile bacteria can survive not only in extreme environments but also in microwaves.

What are extremophile microbes?

- **Extremophiles** – Microbes that live in extreme natural conditions are called extremophiles.
- **Types** - There are different types of extremophiles adapted to live in different extreme conditions.

Extremophiles Types	Description	Examples
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Thermophiles	These organisms live in <i>extremely hot</i> environments, such as hot springs or deep-sea hydrothermal vents.	Thermus aquaticus and Pyrococcus furiosus.
Psychrophiles	These microbes thrive in <i>extremely cold</i> environments, such as polar ice caps and deep oceans.	Psychrobacter cryohalolentis.
Acidophiles	<i>Acid-loving microorganisms</i> that grow in highly acidic environments with pH levels below 3.	Ferroplasma acidarmanus and Acidithiobacillus ferrooxidans.
Alkaliphiles	These organisms <i>prefer basic or alkaline</i> environments with a pH above 9. They are often found in soda lakes.	Alkalimonas universalis and Bacillus alcalophilus.
Halophiles	<i>Salt-loving microbes</i> that thrive in high-salt environments, such as salt mines and salt flats.	Halobacterium salinarum and Halococcus salinarium.
Barophiles	These organisms live <i>under extreme pressure</i> , such as in the deep sea.	Halomonas salaria and Deeplegaster formosus.
Xerophiles	These microbes can survive in <i>extremely dry conditions</i> , such as deserts. They have adaptations to conserve water and manage desiccation.	Bacillus spores and Clostridium species.

- **Radiation Resistant Extremophiles** - Microbes that are resistant to radiation, desiccation, and high temperatures have been found in domestic microwaves and research facilities.

What are the adaptations of extremophiles microbes?

- Microbes adapt to extreme environments by incorporating unique *biological and biochemical processes*.
- **Proteins and enzymes**- They are often *more stable and functional under extreme conditions*.
- **Extremozymes** – It allows them to survive and function in harsh conditions.
 - For example, thermophiles have heat-stable enzymes that are useful in industrial processes (e.g., PCR).
- **Cell membranes**- Their *unique membrane lipids maintain fluidity and integrity* under extreme conditions.
- **DNA repair mechanisms**- They have *specialized mechanisms to repair DNA damage* caused by extreme conditions, such as high radiation or desiccation.

What are their significance in science and industry?

- Understanding them could lead to advances in synthetic biology, disease resistance, and bioremediation.
- They offer potential for new medications and industrial applications.
- **Enzyme development** - They produce enzymes and proteins that remain stable and active under extreme conditions.
 - These enzymes are used in industries like *detergents, biofuels, and pharmaceuticals*.
 - **For example** - *Heat-resistant enzymes like Taq DNA polymerase* from Thermus aquaticus bacteria from a hot spring at Yellowstone National Park, is used in Polymerase Chain Reaction (PCR).
- **Bioremediation** - Radiation Extremophiles are useful in bioremediation of toxic waste.
- **Exoplanet search** - Helps in understanding life in extreme environments, both on Earth and potentially on other planets.
- **Medicine**- Their unique proteins and metabolic pathways aid in creating new treatments and drugs, including antibiotics and other therapeutics.
- **Genetic Research**- Their unique genetic adaptations offer insights into *gene regulation and stress responses, advancing genetic engineering*.
- Understanding them can help in creating synthetic biological systems that can augment the immune system.

- **Agriculture-** Extremophiles can be used to develop crops that are more resistant to extreme conditions, helping improve food security in challenging environments.

13.2 India's Performances in Research and Development (R&D)

Why in news?

Union Budget 2023-24 spurs research and development with the focus on 'Viksit Bharat'.

How India fares in R&D?

- India is on track to become the world's third-largest economy.
- **Increase in patent-** India saw a significant rise in patent grants.
 - It increased from fewer than 25,000 in FY20 to nearly 100,000 in FY24.
- **Growth in patent filings-** India shows increases in patent filings.
 - **World Intellectual Property Organisation** – India achieved the highest growth (31.6%) in patent filings in 2022.
- **Improved global standings-** As per Global Innovation Index India improved its position from 81st place in 2015 to 40th in 2023.
- India moved to 9th place in the Nature Index 2023, surpassing countries like Australia and Switzerland.
- **High-quality research articles-** India's share rose by 44% from 2019 to 2023.

What are the prevailing issues in India's R&D sector?

- **Low investment-** Indian firms invest much less in R&D compared to global firms.
 - The Economic Survey 2023-24 pointing out the stark contrast between Indian and global R&D efforts.
- India's R&D investment as a percentage of GDP remains low, standing at **just 0.64%**.
- It lags significantly behind China (2.41%), the United States (3.47%), and Israel (5.71%).
- **Lack of ambition-** Despite economic growth, there is a lack of ambition to invest in R&D.
- **Limited private sector contribution-** Their contribution to India's Gross Domestic expenditure on R&D (GERD) is only 36.4%.
- It is much lower than China (77%) and the United States (75%).
- **Lack of Indian innovation** - There is indeed a lot of cutting edge R&D done in India but not by Indian companies but by the global capability centres (GCCs) of foreign companies.
- **Low R&D Intensity-** A recent analysis by the Foundation for Advancing Science and Technology (FAST) revealed that the global R&D intensity is 2.8 times higher than that of Indian firms.

Gross domestic expenditure on research and development (GERD) is a measure of the total financial resources spent on research and development (R&D) within a country.

R&D intensity measures the ratio of a firm's R&D investment to its revenue. It reflects the percentage of revenue reinvested in R&D.

What are the provisions for R&D in Union Budget 2024-25?

- It has a separate priority entitled "Innovation, Research and Development".
- The space sector has received a massive boost.
- Other priority areas, such as "Productivity and Resilience in Agriculture", "Energy Security", and "Manufacturing and Services", also provide research and development opportunities.
- It also spurs research and development in important areas such as climate-resilient agriculture, critical minerals, miniature and modular nuclear energy technology, energy-efficient technologies, etc.
- The proposed "Critical Minerals Mission" and the exemption of customs duties on 25 critical minerals will significantly boost critical minerals research.
- Water supply, sewage treatment and solid waste management also figure as priority areas.
- In agriculture, the research focus is on productivity and climate resilience.
- The angel tax abolition is a major incentive for startups raising private capital.

What lies ahead?

- Encourage private sector in R&D to make real progress and enhance its global competitiveness.
- Operationalisation of the Anusandhan National Research Foundation (ANRF) and prototype development with a corpus of Rs 1 lakh crore will pave the way for private sector-driven research and innovation.

Quick Facts

National Research Foundation (NRF)

- It was announced in **2019**.
 - **Allocation** - Budget 2021-22 provides an outlay of Rs 50,000 crore over five years.
 - **Aim** – It aims to ensure that the overall research ecosystem in the country is strengthened with a focus on identified national priority thrust areas.
 - It will support peer-reviewed R&D of all types and across all disciplines.
 - It will seed, grow, and facilitate research at academic institutions, particularly at universities and colleges where research capacity is currently in a nascent stage.
- **World Intellectual Property Organization (WIPO)** – It is a UN agency that protects and promotes IP rights around the world.
 - **Nature Index** – It is a database that tracks institutions and countries/territories and their scientific output.

14. RENEWABLE ENERGY

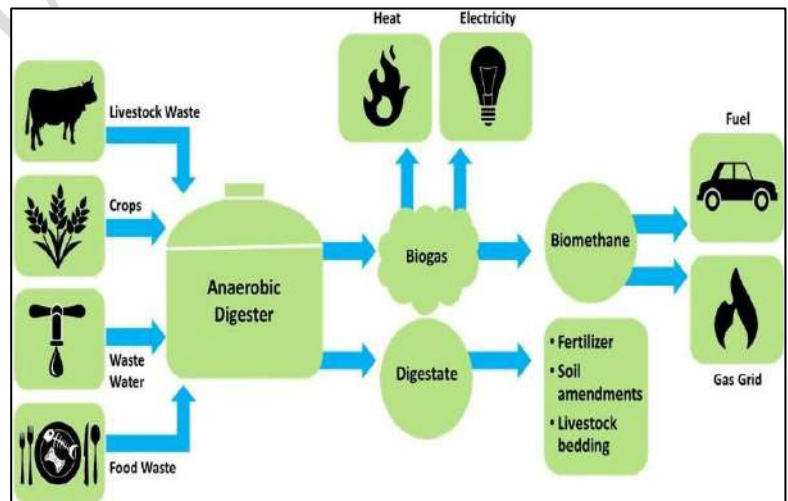
14.1 Biogas as a Sustainable Energy Alternative

Why in News?

India is exploring biogas as a sustainable alternative to fossil fuels.

How Biogas is produced?

- **Biogas** – It is a *renewable fuel* that's produced when organic matter, such as food or animal waste, is broken down **by anaerobic digestion** that is by microorganisms in the absence of oxygen.
- **Input Feedstock** - A wide variety of waste material including animal manure, municipal rubbish or waste, plant material, food waste or sewage can be used.
- **Output** -The yield of anaerobic digestion contains both energy (gas), and valuable soil products (liquids and solids).
- **Composition of Biogas** - Biogas contains roughly 50-70 % methane, 30-40 % carbon dioxide, and trace amounts of other gases.
- **Digestate** - The liquid and solid digested material is used as a soil amendment.
- **Co-digestion** - Mixing multiple wastes in the same digester, can help increase biogas yields.
- **Bio CNG** - Biogas is purified and compressed to make Bio-CNG with more than 90% of methane content.



What are the advantages of Biogas?

- **Reduces fossil fuel dependence** -It brings an opportunity to diversify India's energy mix by providing a locally sourced, renewable alternative to fossil fuels.

A 100 TPD (tonnes per day) CBG plant produces enough CBG to replace approximately 41.24 million liters of diesel per year, offering a significant cost advantage over imported fuels.

- **Decentralized energy source** - In rural areas, where agricultural waste and animal manure are abundant, it can serve as a decentralized energy source.
- **Waste Management** - Conversion of organic waste into biogas not only provides a valuable energy source but also reduces the costs associated with waste disposal.
- **Combating global warming** - It helps to mitigate methane emissions that would escape from landfills or manure lagoons.
- Using methane as a fuel, generates CO₂, which is up to 34 times less potent as a greenhouse gas.
- **Improving air quality** - biogas also plays a crucial role in improving air quality, especially in rural areas where traditional biomass cooking methods, such as burning wood or dung, are prevalent.
- **Carbon savings** – 1 TPD CBG is comparable to planting around 5.02 million trees annually in terms of CO₂ reduction, which would absorb the same amount of CO₂ annually.
- **Lower energy cost** - The production of biogas heavily depends on locally available organic materials, making it less susceptible to external factors.
- This stability in production costs make it a predictable and affordable energy for consumers and businesses.
- **Additional income** - Municipalities and industries that adopt biogas technology can generating revenue from the sale of biogas and organic fertilizers.
- **Clean transport fuel** - Compressed biogas (CBG) can be used as a substitute for compressed natural gas (CNG) in vehicles, offering a cleaner and often cheaper alternative to conventional fuels.
- The adoption of CBG in public transportation, commercial fleets, and agricultural machinery can significantly reduce fuel costs, especially in regions where organic waste is readily available.

India generates 62 million tonnes of municipal solid waste per year, and 50% of it is composed of organic waste.

What are the challenges in Biogas production?

- **Ineffective waste management** - Poor collection, improper segregation, and inadequate waste transportation create barriers for utilising waste in biogas production.
- **Complex technology and infrastructure** - The setup and operation of biogas plants require complex technology and specialized knowledge.
- **Competition with other energy sources** - Biogas competes in the energy market with other renewable energy sources such as wind and solar energy.
- **Economic viability** - The economic viability of biogas plants strongly depends on various factors, such as energy prices, costs for plant construction and operation.
- **Regulatory barriers** - The regulatory requirements and bureaucratic hurdles can complicate and lengthen the process of plant planning and implementation.

Government schemes for Biogas Promotion

- **Step Towards Sustainable Alternative Future (SATAT)** - It encourages entrepreneurs to set up CBG plants, produce & supply CBG to Oil Marketing Companies (OMCs) for sale as automotive & industrial fuels.
- **Galvanizing Organic Bio-Agro Resources Dhan (GOBARDHAN)**- It aims to support villages effectively manage their cattle waste, agricultural waste/residue and all other organic waste.
- Department of Drinking Water and Sanitation, Ministry of Jal Shakti is the coordinating department for GOBARDhan.
- **Waste to Wealth Mission** – It aims at strengthening the waste management system in India by identifying and validating innovative technology solutions and models to achieve a zero landfill and zero waste nation.
- It is spearheaded by the Office of the Principal Scientific Advisor to the Government of India (O/o PSA).

What lies ahead?

- To fully realize the potential of biogas, continued policy support, technological innovation, and investment in infrastructure are essential.
- Public-private partnerships, along with community involvement, can play a crucial role in scaling up biogas production and making it a mainstream energy source.
