

# OFFICERS' Pulse

## IN-DEPTH

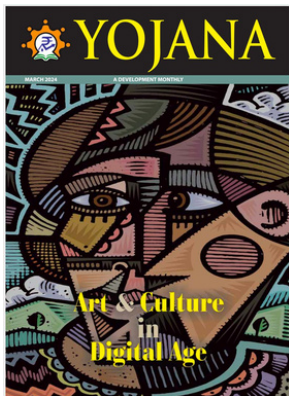
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## 1) Adoption of Digital and Innovative Farming Techniques

*(GSIII: Major Crops - Cropping Patterns in various parts of the country, - Different Types of Irrigation and Irrigation Systems; Storage, Transport and Marketing of Agricultural Produce and Issues and Related Constraints; E-technology in the aid of farmers)*

### Context

- Innovative farming practices are ushering in a new agricultural era, one that is more sustainable, efficient, and resilient. It brings a remarkable transformation through the combination of cutting-edge technologies and novel approaches.

### Emerging Farming Practices

#### 1. Precision Agriculture:

- Precision Agriculture is a management approach that involves **collecting, processing, and analysing temporal, spatial, and individual data**. This data is then integrated with other information to **aid management decisions** based on estimated variability, aiming to enhance resource utilisation efficiency, productivity, quality, profitability, and sustainability in agricultural production.
- Precision agriculture allows farmers to **precisely regulate inputs** such as water, fertiliser, and pesticides, leading to higher efficiency and less waste.

#### 2. Smart Farming:

- Smart farming combines **Internet of Things (IoT) devices with connectivity** to form a networked and automated agricultural ecosystem comprised of sensors, actuators, and intelligent equipment that collect and exchange data in real time.

- It is a new term that refers to **managing farms with IoT, robotics, drones, and artificial intelligence (AI)** to boost the number and quality of products while optimising the human labour required for production.
- Modern agriculture is increasingly reliant on automated machinery, such as self-driving tractors and robotic harvesters. These technologies **reduce farmers' physical workload** while **increasing precision and efficiency** in tasks such as planting, harvesting, and weed control.

#### 3. Vertical Farming and Controlled-Environment Agriculture:

- Vertical farming and controlled-environment agriculture (CEA) involve **growing crops in stacked layers or under regulated conditions, such as greenhouses or hydroponic systems**.
- Vertical farming **maximises land use efficiency while minimising the environmental impact** of traditional farming operations.
- Farmers may establish ideal circumstances for plant development all year by using artificial lighting, climate control, and fertiliser solutions. This not only **increases agricultural yields but also enables crop growth in climatically vulnerable areas**.

#### 4. Blockchain Technology in Agriculture:

- Blockchain technology is making its way into agriculture by **improving transparency and traceability** throughout the supply chain.
- Farmers, wholesalers, and consumers can use blockchain to keep a **secure and unalterable record** of all agricultural product transactions and movements.

- This **ensures the authenticity** of food products, **lowers the danger of fraud**, and allows consumers to make **informed decisions** about the origin and quality of their foods.

### Digital Farming Techniques

- Digital farming approaches include a wide range of technologies and strategies used to **optimise agricultural processes with digital tools**.

#### 1. Technologies in Precision Agriculture:

- A key element of precision agriculture is **GPS technology**. It enables farmers to plan their fields precisely, which makes it easier for machines to navigate and apply resources in the right places.
- Additional technologies, such as the **use of field based sensors**, offer **real-time information on crop health, nutrient levels, and soil moisture**.
- **Weather stations and environmental sensors** are examples of IoT equipment that add to a thorough knowledge of the farm's conditions.

#### 2 Drones:

- High-resolution photographs of fields are taken by drones fitted with cameras and sensors (**crop monitoring**).
- Farmers can **spot problem regions**, including pest infestations, nutrient shortages, or water stress, with the use of this **aerial imagery**. Surveying vast areas quickly and effectively is made possible by drones.

#### 3. Automated Technology:

- Without the need for direct human assistance, automated equipment with GPS and sensor technology can carry out operations including **planting, harvesting, and**

**ploughing** (autonomous tractors and harvesters).

- This **guarantees accuracy** in farming operations while simultaneously **lowering labour expenses**.

#### 4. Variable Rate Technology (VRT):

- It enables the **application of inputs such as water, herbicides, and fertilisers to a field at different rates**.
- This method makes sure **resources are applied exactly where and when they are needed** by considering the spatial variability of crop and soil conditions.

#### 5. Smart Irrigation System:

- **Soil moisture sensors** are used by smart irrigation systems to **calculate the amount and timing of water that crops require**.
- By doing this, **excessive irrigation is avoided**, protecting water supplies and enhancing crop health.

#### 6. Robots for Agricultural Operations:

- The usage of robots for agricultural operations is growing. These autonomous vehicles can **go across fields, effectively harvesting crops or spotting and eliminating weeds**.
- Robotics **decreases the need for physical labour while increasing efficiency**.

#### 7. Machine Learning:

- To **forecast crop yields, disease outbreaks, and market trends**, machine learning algorithms examine both historical and current data (crop prediction models).
- Farmers may now make proactive decisions and modify their plans in response to situations that are predicted through these predictive analytics.

#### 8. Digital Twins:

- Digital twins create **virtual replicas of physical farms**. This allows farmers to simulate and

optimise various scenarios before implementing changes in the real world. Digital twins contribute to efficient planning and resource management.

### Digital Divide

- The digital divide in the realm of digital agriculture represents a **significant challenge** that has far-reaching implications for the equitable adoption and benefits of technological advancements in farming practices.
- This divide manifests in **disparities related to access, connectivity, and technological literacy** among various stakeholders in the agricultural sector.
- This divide not only **widens existing disparities between rural and urban/developed and less-developed areas** but also between **large commercial farms and smaller, resource-constrained agricultural enterprises**.
- Efforts to **enhance digital literacy, provide affordable access to technology, and implement supportive policies** are essential in narrowing this gap and promoting an inclusive and technologically advanced agricultural landscape.
- **Promotion of the FPOs** is a potential option to tackle the issue of the digital divide.

### Conditions for Digital Transformation

- The digital transformation of agriculture is influenced by various factors across different contexts.
- The fundamental conditions necessary for technology utilisation encompass **availability, connectivity, affordability, integration of information and communication technology (ICT) in education,** and the implementation of **supportive**

**policies and programmes,** such as those related to e-government, to promote digital strategies.

- Additionally, there are enabling conditions, often referred to as **'enablers,'** which contribute to the smoother adoption of technologies.
- These include the **widespread use of the internet, mobile phones, and social media.**
- **Digitalisation** is crucial for Indian agriculture to enhance competitiveness and achieve self-sustainability.

### Way Forward

- **India's National AI Strategy** seeks to unlock the economic and societal advantages presented by the technology. Additionally, it acknowledges **agriculture** as a key sector for the deployment of AI-driven solutions.
- **'Agriculture 4.0'** has gained popularity during the last decade. Agriculture 4.0 is the **seamless integration of internal and external networking in farming processes,** much like Industry 4.0.
- This means that all facets of farm operations must have digital information, electronic contact must exist with outside parties like suppliers and consumers, and automated data transfer, processing, and analysis procedures must be the norm.
- **Agriculture 5.0** is envisioned to centre around robotics and various forms of artificial intelligence.
- With the advent of **FPOs** in India, there is a great opportunity for digital agriculture to cover the whole agricultural value chain, from upstream operations like cultivation and inputs to downstream activities like post-harvest handling and value addition like food processing.

- The FPOs **facilitate the connection between farmers, their produce, and the market.** Furthermore, FPOs make **technology more accessible and inexpensive,** which helps all parties involved — even the smallest-scale farmers— and creates a win-win situation.

## 2) Organic Farming Benefits, Present Status and Future Prospects

*(GSIII: Major Crops - Cropping Patterns in various parts of the country, - Different Types of Irrigation and Irrigation Systems; Storage, Transport and Marketing of Agricultural Produce and Issues and Related Constraints; E-technology in the aid of farmers)*

### Context

- Organic farming is an alternative to the conventional farming system which involves **sustainable and environment friendly agricultural practices that avoid synthetic pesticides, fertilisers and genetically modified organisms.**
- It relies on achieving **high crop yields without harming natural environment, disrupting ecosystem and posing no health hazards** to the people who work on farms and use the produce.
- Organic farming is based on the **application of non-synthetic farm inputs like vermi-compost, green manure, bio-fertilisers, crop residues, etc.** to enhance soil fertility.
- For pest and disease control, organic farming embraces **eco-friendly methodologies,** such as strategic crop rotation, trap crops, the use of bio-pesticides, biological control of insects, mechanical traps etc.
- This holistic approach not only fosters environmental harmony but also promotes **long-term health and vitality** of the agricultural ecosystem.

### Need and Benefits of Organic Farming

- First and foremost, organic farming **promotes biodiversity, conserves soil health and reduces water pollution** by avoiding the use of synthetic pesticides and fertilisers and thus **ensuring the long-term sustainability of agriculture.**
- Further, embracing organic farming practices contributes to the **resilience and prosperity of farmers.** It provides **economic sustainability** to the farmers by reducing input cost on one hand and simultaneously creating better market access on the other.
- The growing demand for eco-friendly and chemical-free products, fetches a **premium price** and thus provides **better income and market access.**
- The reduced dependence on chemical inputs **improves the overall health of the farming community.**
- Organic farming brings significant **benefits to consumers** by providing them with **healthier and safer food options.** Organic produce is free from chemical residues and often contains **higher nutritional value,** contributing to better overall health of consumers.
- The cultivation practices emphasise natural inputs and sustainable methods, resulting in nutrient-rich crops that often **have higher levels of vitamins, minerals, and antioxidants.**
- It potentially opens up the **international market** for organic products, thereby significantly enhancing the country's agricultural export.

- The emphasis on organic farming can also **address public health concerns** related to chemical residues in food, leading to potential healthcare cost savings.
- Overall, the widespread adoption of organic farming in India presents a holistic solution that **harmonises environmental, economic and public health interests.**

### Status of Organic Farming

- The organic farming system in India has a rich historical foundation, dating back to ancient times.
- The **National Programme for Organic Production (NPOP)** launched in 2001, laid the foundation for systematic development of the organic agricultural sector in the country.
- NPOP is being implemented by **APEDA** under the **Ministry of Commerce and Industry**. The NPOP provides an **institutional framework for accreditation and certification** of various facets of organic agriculture processes.
- Notably, the NPOP standards for production and accreditation have earned **international recognition** including countries like the USA, European Union and Switzerland.
- The NPOP was brought under the ambit of **Foreign Trade Development and Regulation (FTDR) Act** in 2004. As per this mandate, **no organic products can be exported from India unless certified under NPOP.**
- The **National Centre for Organic Farming**, established in 2004, is a **nodal organisation for promoting organic farming** in the country. It was renamed as **National Centre for Organic and Natural Farming (NCONF)** in 2022.

### Area under Organic Farming

- **India** is the **sixth largest country** in the world in terms of **total area**

**under organic farming.** Currently, around **2.4% of net cultivated area** is either under **certified or in the conversion process** of organic farming.

- As on March 31, 2023, total area under organic certification registered under the National Programme for Organic Production reached **101.72 lakh hectares** in the country.
- Among all states, **Chhattisgarh** (due to its large wild harvest collection area) emerged as a frontrunner, contributing nearly **32 per cent of the country's total area under organic farming.** It was followed by **Madhya Pradesh** (22.83 per cent), **Maharashtra** (12.63 per cent), **Rajasthan** (9.22 per cent), **Gujarat** (9.20 per cent), **Himachal Pradesh** (2.10 per cent) and **Odisha** (1.95 per cent).
- **Sikkim** became the **first State in the world to become fully organic** with effect from 2016, other States, including Tripura, Himachal Pradesh and Uttarakhand have also set similar targets.
- India, with 15.99 lakh organic producers, has the honour of having the **highest number of organic farmers in the world.**

### Organic Production

- India, with its diverse agro-climatic conditions, is endowed with significant potential to cultivate a wide array of organic products.
- India's organic production encompasses a diverse array of food items, ranging from **cereals, pulses, millets, oilseeds, tea, coffee, fruits, vegetables, spices, dry fruits, sugarcane, and processed food.**
- The organic production is not limited to the edible sector but also extends its reach to include the cultivation of **organic cotton, fiber,**

**medicinal, herbal and aromatic plants.**

- Among different states, **Madhya Pradesh** is the single largest producer of organic products. It accounts for nearly 28 per cent of the country's organic production. It is followed by **Maharashtra** (27 per cent), **Rajasthan** (11 per cent), **Karnataka** (8 per cent) and **Uttar Pradesh** (7 per cent).
- These **top ranking five states** collectively account for nearly **81 per cent** of the country's organic production, underscoring a substantial opportunity for the widespread adoption of organic farming practices in other regions across the nation.
- In terms of commodities, **fiber crops are the single largest category followed by oil seeds and sugar crops.**

#### Exports of Organic Products

- Organic farming in India is mainly **export intensive**. During the fiscal year 2022-23, the organic export volume of India reached an impressive **312,800.51 metric tonnes**.
- The **revenue generated** from the export of organic products amounted to approximately Rs. **5,525.18 crore (USD 708.33 million)**.
- The high-quality organic exports of India, find their way to various international markets, including the USA, European Union, Canada, Great Britain, Switzerland, Turkey, Australia, Ecuador, Korea, Vietnam, Japan and more.

#### Initiatives

- The **National Mission for Sustainable Agriculture (NMSA)** has been made operational from the year 2014-15. The NMSA focuses on **increasing water-use efficiency, promoting organic**

**nutrient management and adopting climate-resilient sustainable agricultural practices.**

- It provides **financial incentives**, training programmes and technical support to farmers to encourage the adoption of organic and sustainable farming techniques.
- Furthermore, **Paramparagat Krishi Vikas Yojana** (launched in 2015) encourages the adoption of organic farming practices by providing **financial assistance to farmers**.
- Under PKVY, groups of farmers are formed to cultivate organic crops and are supported with financial aid for inputs, seeds, and other essential resources.
- This scheme not only facilitates the **transition to organic farming** but also **promotes community participation and cooperation.**

#### Challenges

- Despite the positive trends, organic farming in India faces several challenges. **Limited awareness and education** among farmers about organic practices, **high initial costs** of certification and **lack of a well established market infrastructure** for organic products are some of the hurdles that need to be addressed.
- During the transition period to organic farming, **initially yields may temporarily decrease**, which poses financial challenge to the growers.
- Farmers often encounter **difficulties in managing pests and diseases by using natural methods and traditional farming practices** which creates scepticism about the effectiveness of organic methods.
- The issues related to **quality control operations** while



**upholding stringent standards**, further complicate the organic farming landscape.

- Addressing these challenges requires a comprehensive approach involving education, policy support, research, and infrastructure development to ensure the sustainable growth of organic farming in India.

### Way Forward

- The demand for organic products has been rising rapidly due to **increasing health consciousness and environmental concerns**.
- To take advantage of the potential of the country, strategic emphasis is imperative. First and foremost, **addressing the issue of low productivity** under organic farming necessitates **increased research and development** on farming techniques and **better dissemination of knowledge** to enhance the efficiency and profitability of organic farming.
- The **integration of technology** can play a pivotal role in the future of organic farming in the country.
- **Precision farming techniques, IT-based monitoring system and data analytics** can optimise resource utilisation, provide real-time information to the farmers, and improve crop yield.
- Further, **investing in research and development** is crucial to make organic farming more efficient and attractive to a new generation of farmers.
- **Developing resilient crop varieties, exploring new organic pest control methods, and enhancing soil health** through innovative techniques will contribute to the long term sustainability of organic farming.
- **Strengthening existing schemes, providing financial incentives**

**and addressing the challenges** faced by farmers, will create an environment conducive for the widespread adoption of organic practices.

- **Encouraging collaboration and networking** among the stakeholders including farmers, consumers, non-governmental organisations, researchers, farmer producer organizations (FPOs) and industry will foster a supportive ecosystem.
- **Educating consumers** about the benefits of organic produce is the key to sustain the demand for organic products.
- By effectively addressing challenges and seizing opportunities, India stands poised to emerge as a global front runner in the realm of organic farming and sustainable agricultural practices.

### 3) Vertical Farming and Hydroponics

*(GSIII: Major Crops - Cropping Patterns in various parts of the country, - Different Types of Irrigation and Irrigation Systems; Storage, Transport and Marketing of Agricultural Produce and Issues and Related Constraints; E-technology in the aid of farmers)*

#### Context

- Addressing the **rising global food and nutritional demand** with a growing global population, **diminishing farmlands, declining soil fertility and increasing urbanisation** has prompted the adoption of advanced farming methods that are crucial for sustainable and efficient food production systems.
- In **India, 53% are expected to live in cities by 2050**. Limited agricultural land for conventional farming necessitates the exploration of innovative food

production technologies like **Urban Farming (UF)** including **vertical and hydroponic farming**, which can ease pressure on agricultural lands for a healthier and more sustainable future.

### Understanding Vertical Farming and Hydroponics

- Vertical farming (VF) revolutionizes traditional agriculture by employing **soilless cultivation** in a **multi-level, protected indoor environment**, departing from conventional soil-based farming and horizontal crop growth on a single level.
- **Prof. Despommier** is acknowledged as the **founding father of 'Vertical Farming,'** who created high-tech vertical farms as an alternative solution to address nutritional needs, particularly in megacities.
- Vertical farming has the potential to **enhance food production, maintain quality and contribute to sustainable urban farming.**
- It is an **indoor urban technique** involving **large-scale food production within multistorey buildings.**
- Vertical farming adopts a unique approach to **maximise space and efficiency** by **cultivating plants in vertically stacked layers or inclined surfaces, often within controlled environments** like greenhouses or warehouses.
- This method proves **particularly advantageous in densely populated urban areas** where space is limited, allowing for optimal use of available space.

### Nutrient-providing methods

- Various shapes and sizes of vertical farms worldwide employ one of three nutrient-providing methods: **Hydroponics, Aeroponics, or Aquaponics.**

### Hydroponics:

- This prevalent technique in vertical farming involves **growing plants on soil-free substances continuously irrigated with nutrients.**
- **Plant roots are submerged in a nutrient solution**, and the system uses **60–70% less water** than traditional agriculture, making it widely utilised in numerous vertical farms worldwide.

### Aeroponics:

- Developed by **NASA** in the 1990s for space plant growth, aeroponics **cultivates plants in a soil-free mist environment with roots hanging down in a closed-air container.**
- This method uses **90% less water than hydroponics**, making it a highly efficient system of food production.
- Plants grown aeroponically **absorb more nutrients, resulting in healthier and more nutritious produce.**

### Aquaponics:

- Going beyond hydroponics, aquaponics **integrates fish production into plant cultivation.** The system utilises fish-produced nutrient rich waste as a feed resource for plants, and plants, in turn, purify and recycle wastewater for fishponds.
- While this system offers ecological benefits, its **complexity and higher cost** make it less common in vertical farming.

### Advantages of Hydroponics

- Hydroponic farming presents an **intriguing alternative to traditional soil-based agriculture** by nurturing plants in nutrient-rich water solutions instead of soil, fostering quicker and more efficient growth.

- This soil-less approach proves **versatile, cultivating a diverse range of crops**, from vibrant leafy greens to fruitful plants.

#### Advantages:

- Hydroponics in conjunction with vertical farming **utilises 99% less land** compared to traditional farming due to the **concentrated root system**.
- Hydroponics **requires less water** compared to conventional farming practices.
- Enables the creation of a **controlled microclimate**, allowing year-round indoor cultivation of regional or seasonal crops.
- Protects crops from soil-borne pests and diseases, and adverse weather conditions, thereby **reducing the need for pesticides and fertilisers**.
- Vertical farming **enhances plant productivity per unit area** compared to horizontal hydroponic methods.

#### Disadvantages

- **High upfront infrastructure** costs pose a significant hurdle to widespread adoption.
- **Shortage of expertise** and the **need for a controlled growing system** necessitate a highly educated workforce, leading to elevated labour costs.
- It is **energy-intensive** and requires artificial lighting, temperature, and humidity requirements, which **increases the cost of production**.
- The **absence of natural pollinators** in controlled conditions can result in poor fruit sets and the production of small, misshapen fruits.
- The **range of crops cultivated commercially** is usually **confined to leafy vegetables and microgreens**.

- Require **continuous attention and care**, with components like pumps and nutrient delivery systems needing regular maintenance.

#### Way Forward

- Vertical farming, though expensive, is more affordable by utilising cheap and available shipping containers and abandoned warehouses.
- **Collaborative research** is important to bring together current technology practices for increased sustainability.
- Hydroponics and vertical farming offer efficient and sustainable solutions to urban agriculture challenges.
- Hydroponics maximises resource use, enables year-round crop production, and increases yields, potentially revolutionising food cultivation, especially leafy vegetables.
- The integration of smart technologies and automation enhances agricultural productivity in vertical farming.
- While hydroponics and vertical farming can be a good solution, they need more acceptance for widespread adoption. Research shows that supportive policies and incentives, like grants and tax benefits, can encourage investment and promote urban agriculture through agri-startups.

#### 4) India-Mauritius Relationship: (GS-II: India and its Neighborhood-Relations)

##### Context:

- Prime Minister Narendra Modi and Prime Minister Pravind Jugnauth of Mauritius jointly inaugurated an airstrip and a jetty that India has built on Agaléga, a set of two islands in the western Indian Ocean, along with some other

community development initiatives.

### Significance of good relations with Mauritius:

- **Cultural Ties:** Approximately 70% of the population of Mauritius is of Indian origin, fostering strong connections between the two nations.
- **Strategic Partnership:** India benefits from strategic cooperation with Mauritius, particularly in enhancing maritime security and countering common security threats in the Indian Ocean region. This includes cooperation in **anti-piracy efforts, maritime domain awareness, and joint patrolling** to safeguard sea lanes of communication.
- Mauritius is a key partner of India's '**Neighbourhood First Policy**' and a special partner under **Vision SAGAR**, and that the two countries have a vibrant, strong, and unique partnership.
- **Sustainable Development Assistance:** India's involvement in the development of Agaléga demonstrates its commitment to assisting Mauritius in enhancing its infrastructure, maritime security capabilities, and overall well-being.
  - **India does not believe in economic colonisation of smaller countries** by luring them into debt traps. It has demonstrated that its methods of aiding smaller neighbours is more trustworthy and humane, even if somewhat inefficient.
- **Respect for Sovereignty:** India's approach to its relationship with Mauritius emphasizes respect for sovereignty and sensitivity to the concerns of smaller nations. India seeks to build trust and

cooperation through transparent and mutually beneficial partnerships, without imposing its agenda or infringing on Mauritius' sovereignty.

- **Economic Partnership:** Mauritius serves as an important economic partner for India, with significant **bilateral trade and investment ties**. India relies on Mauritius as a gateway for investment into Africa due to the strong Indian diaspora presence and favorable tax treaties between the two countries.
- **Regional Stability:** A stable and prosperous Mauritius contributes to regional stability in the Indian Ocean region. India benefits from a stable neighborhood, and maintaining a cordial relationship with Mauritius helps prevent the spread of instability or conflict in the region, thereby safeguarding India's interests.
- **Diplomatic Support:** Mauritius has historically been supportive of India's diplomatic initiatives in international forums. Maintaining a positive relationship with Mauritius ensures continued diplomatic support from the country on various global issues, reinforcing India's position on the global stage.

### Conclusion

- India has deep strategic stakes in the Indian Ocean. New Delhi has to maintain cordial diplomatic relationships with the governments of island nations in the region while continuously pursuing its strategic interests. In the case of Mauritius, strengthening and maintaining the current relationship will give good returns.

## 5) Gaganyaan

*(GS-III: Awareness in the fields of IT, Space, Computers, Robotics, Nano-*

**technology, Bio-technology and issues relating to Intellectual Property Rights)**

**Context:**

- Recently, Prime Minister Narendra Modi publicised the final shortlist of candidates to be astronauts on board the maiden human spaceflight mission — called Gaganyaan — of the Indian Space Research Organisation (ISRO).
- Assuming two important test flights this year and the next are successful, the first crewed flight of the mission is scheduled for 2025.

**What is Gaganyaan Mission?**

- Gaganyaan is the name of the **ISRO mission to send Indian astronauts to low-earth orbit for a short duration, onboard an Indian launch vehicle.**
- Technically, it is a demonstration mission: it will test various technologies required for human spaceflight, which remains the most complicated form of spaceflight, and demonstrate India's familiarity with their production, qualification, and use.
- ISRO also set up a **coordinating body for Gaganyaan called the Human Space Flight Centre (HSFC).**

**What are the components of Gaganyaan?**

- **The Launch Vehicle Mark-3: The LVM-3 is the launch vehicle.** Formerly called the GSLV Mk-III, it is a **three-stage rocket.**
  - The first stage comprises two solid-fuel boosters strapped to the rocket core.
  - The second stage is powered by two liquid-fuelled and clustered Vikas 2 engines.
  - The third stage has the CE-20 indigenous cryogenic engine with liquid hydrogen and liquid oxygen as fuel and oxidiser, respectively.

- **The orbital module: The 8.2-tonne orbital module is the object the LVM-3 rocket will launch and place in low-earth orbit.**

- It consists of the crew module and the service module.
- The crew module can house up to three astronauts for a week. It includes parachutes to slow its descent to the ground once it descends from orbit; an environmental control and life-support system (ECLSS; to control the temperature, breathing environment, waste disposal, fire protection, etc.); and the crew escape system, which the astronauts can use to escape in case the rocket malfunctions during its ascent.
- The service module contains the propulsion system required to raise the orbital module's altitude once it separates from the rocket and later to propel it back towards the earth.

- **The crew:** Of the first four astronaut candidates, Prashant Nair, Ajit Krishnan, and Angad Pratap are group captains and Shubanshu Shukla is a wing commander, all in the Indian Air Force (IAF).

- **The crew module will include a gynoid (feminine robot) named 'Vyommitra'** fit with sensors to track the effects of radiation and weightlessness, monitor capsule conditions, and sound alarms in the event of an impending emergency, aside from being able to perform some other tasks.

**What will Gaganyaan achieve?**

- **Indian Space Policy 2023** provides an overview of what the Indian space programme will aim for in the coming decades as India joins a host of countries going to space, the moon, and beyond while conducting scientific, commercial, and exploratory missions.
- This new 'space race' extends geopolitical boundaries drawn on the earth into outer space.
- The result is a heavy premium on the human presence of different nationalities for longer durations in space and on the moon.

### Conclusion

- Against this backdrop, Gaganyaan will establish India's self-sufficiency vis-à-vis sending humans to space, on timelines it can control, instead of relying on expensive contracts with foreign launch services — and in step with other efforts to represent India in the final frontier.

## 6) Case for a Women's Urban Employment Guarantee Act

*(GS-I: Role of Women and Women's Organization, Population and Associated Issues, Poverty and Developmental issues, Urbanization, their problems and their remedies)*

### Context

- Despite functioning at a fraction of its intended capacity, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) has been pivotal in providing financial autonomy to women in rural areas. In this scenario, the case for Women's Urban Employment Guarantee Act (WUEGA) becomes stronger.

### Need for WUEGA:

- **Addressing Unmet Demand:** The Periodic Labour Force Survey (PLFS) pegs women's employment rate in urban areas at 22.9% in the

last quarter of 2023. The unemployment rate in urban areas, which is a measure of how many would like employment, is 9% compared to 4% in rural areas.

- This evidence suggests a high unmet demand for employment among urban women, as indicated by the low employment rates and comparatively higher unemployment rates in urban areas.
- WUEGA would aim to bridge this gap by creating accessible and inclusive employment opportunities for women.
- **Overcoming Barriers to Entry:** Urban women face various barriers such as social norms, lack of safety, and limited transportation options that inhibit their entry into the workforce. WUEGA would need to address these barriers by providing safe working environments, childcare facilities, and free public transportation for women.
- **Skill Development and Training:** Many urban women lack the necessary skills to secure stable employment. WUEGA would need to incorporate provisions for skill development and training programs to enhance women's job readiness and employability.
- **Ensuring Gender Representation:** Women are often underrepresented in decision-making roles and program management. WUEGA would need to prioritise gender representation by ensuring that women form a significant proportion of the program management staff and have a voice in shaping program policies and implementation.
- **Promoting Financial Security and Welfare:** Economic

empowerment goes hand in hand with ensuring financial security and welfare for women. WUEGA would need to include provisions for incentives, welfare benefits, and resources such as maternity entitlements, pensions, and emergency funds to support women's economic independence and well-being.

#### Probable issues in Implementation:

- **Resource Allocation:** Ensuring adequate funding and resources for the program, including wages, infrastructure, training, and administrative costs, may cost around 2% of the National GDP. This huge expenditure is a challenge to the government.
- **Gender Bias and Discrimination:** Overcoming societal attitudes and gender biases that hinder women's participation in the workforce and ensuring equal opportunities and treatment within the program.
- **Infrastructure and Logistics:** Establishing worksites, childcare facilities, and transportation networks within a 5-km radius may require significant infrastructure development and logistical planning, particularly in densely populated urban areas.
- **Monitoring and Evaluation:** Implementing robust monitoring and evaluation mechanisms to track program effectiveness, ensure transparency, prevent corruption, and address any issues of mismanagement or inequities in program delivery.
  - Such a scheme has to be rolled out in a phased manner with periodic assessments on uptake and the nature of the shelf of works. This is also likely to smoothen the cost.

#### Conclusion

- Reducing gender gaps and increasing women's empowerment are part of the Sustainable Development Goals. WUEGA can help in increasing women's employment rates and can be an engine for economic growth.

### 7) Critical Minerals

*(GS-I: Distribution of Key Natural Resources across the world; factors responsible for the location of primary, secondary, and tertiary sector industries in various parts of the world including India)*

#### Context

- Critical minerals have **no particular definition** and **countries identify** the minerals **critical to** them using their own criteria.
- The US has identified 50 minerals while Japan has identified 31. **India has identified 30 critical minerals** depending upon their **disruption potential, substitutability, cross-cutting** usage across different sectors, import reliance, recycling rates etc.
- The states/UTs which house these 30 identified critical minerals are Bihar, Gujarat, Jharkhand, Odisha, Tamil Nadu, Uttar Pradesh, Chhattisgarh and Jammu and Kashmir.
- As far as India is concerned, the availability of critical minerals (and rare earths) is crucial as it has massive plans for decarbonisation and to become net-zero by 2070.
- By 2030, India wants to set up 500 GW of non-fossil fuel power generating capacity.
- It also wants 30 percent of private cars, 70 percent of commercial vehicles and 80 percent of two/three wheelers to go electric. All this will not be possible without a steady source of lithium and

other minerals required to manufacture batteries.

### Critical Minerals and Rare Earth Minerals, are they same?

- Critical minerals and rare earths **should not be used interchangeably** as is done very often.
- **Rare earth minerals are a subset of critical minerals** that comprise a group of 17 elements found in the Earth's crust, with unique magnetic, luminescent, and catalytic properties.
- Despite their name, rare earth minerals are **relatively abundant** in the Earth's crust; however, they are often dispersed and not typically found in high concentrations, making their **extraction and processing challenging**.
- Rare earth minerals are essential components in various **high-tech applications, including electronics, renewable energy systems, defence technologies, and electric vehicles**.
- **China currently dominates the global rare earth minerals market**, controlling a significant portion of both production and processing capacity.
- Examples of rare earth minerals include **neodymium, praseodymium, dysprosium, lanthanum, and cerium, among others**.

### Challenges before India in access to Critical Minerals:

- **Heavy Reliance on Imports:** India currently relies heavily on imports for most critical minerals, which poses challenges in terms of supply security, price volatility, and vulnerability to geopolitical tensions and trade disruptions.
- **Limited Domestic Production:** While India has identified critical

minerals within its territory, domestic production capacity is often insufficient to meet growing demand, necessitating increased exploration, investment, and development of mining infrastructure.

- **Inadequate Processing Capability:** Access to critical minerals is not enough; India also needs the technology and infrastructure for processing and manufacturing final products, such as batteries for electric vehicles and renewable energy systems. Building these capabilities requires significant investments and time.
- **Geopolitical Competition and Monopoly:** China's dominant position in the critical minerals market, including processing capacity and manufacturing of finished products, poses challenges for India's access to these resources due to potential export restrictions, pricing control, and geopolitical tensions.
- **Environmental and Social Concerns:** The extraction and processing of critical minerals can have significant environmental and social impacts, including habitat destruction, water pollution, and displacement of indigenous communities. Addressing these concerns while pursuing resource development adds complexity and costs to the process.
- **Technological Dependence:** India's reliance on foreign countries, particularly China, for processing technology and expertise further complicates efforts to secure access to critical minerals, as it limits the country's ability to control the entire value chain and adds dependency risks.
- **Long Gestation Period for Development:** Developing



domestic sources of critical minerals, from exploration to production and processing, requires significant time and investment. The gestation period for establishing a robust supply chain can span over 15 years or more, delaying India's efforts to achieve its decarbonization and industrialization goals.

### Steps to tackle the problem of Critical Minerals:

- **Diversification of Supply Sources:** India should actively seek to diversify its sources of critical minerals beyond traditional suppliers, reducing dependence on a single country or region. This can involve bilateral agreements, partnerships with other resource-rich countries, and exploration efforts to identify new domestic reserves.
  - A joint venture company namely **Khanij Bidesh India Ltd. (KABIL)** has been incorporated with the equity contribution from three Central Public Sector Enterprises namely, National Aluminium Company Ltd, Hindustan Copper Ltd and Mineral Exploration Company Ltd with the objective to identify and acquire overseas mineral assets of critical & strategic nature such as Lithium, Cobalt & others so as to ensure supply side assurance.
  - KABIL has engagements with countries like Argentina, Australia etc. to acquire critical & strategic minerals assets.
- **Boost Domestic Production:** Invest in exploration, mining, and processing infrastructure to

increase domestic production of critical minerals. This may involve providing incentives for private sector participation, streamlining regulatory processes, and facilitating technology transfer and knowledge exchange.

- The **Mines and Minerals (Development and Regulation) Amendment Act, 2023**, which came into force in 2023, had listed 24 critical and strategic minerals in Part D of the First Schedule of the MMDR Act.
- The amendment provided that mining lease and composite licence of these 24 minerals shall be auctioned by the Central Government.
- **Strengthen Processing and Manufacturing Capabilities:** Develop domestic processing and manufacturing capabilities for critical minerals, including investing in research and development, technology innovation, and skill development. This can help reduce reliance on imports for processed materials and value-added products.
- **Promote Recycling and Circular Economy:** Encourage the recycling of critical minerals from end-of-life products and waste materials to reduce the need for primary extraction. Implement policies and incentives to promote resource efficiency and the circular economy approach in key industries.
- **International Partnerships and Collaborations:** Forge strategic partnerships and collaborations with resource-rich countries, technology providers, and international organisations to secure access to critical minerals

and build processing and manufacturing capabilities. Participation in initiatives like the **US-led Minerals Security Partnership (MSP)** can facilitate knowledge sharing and technology transfer.

- The basic premise of MSP is “**friend shoring**”, meaning moving manufacturing away from authoritarian states (read China) to allies.
- **Invest in Sustainable Mining Practices:** Promote responsible and sustainable mining practices that minimise environmental degradation and social impacts associated with mineral extraction. Implement regulations, monitoring mechanisms, and incentives to ensure compliance with environmental and social standards.
- **Support Research and Innovation:** Invest in research and innovation to develop alternative materials, technologies, and processes that reduce the reliance on critical minerals or improve their efficiency of use.
- **Long-term Planning and Policy Framework:** Develop a comprehensive long-term strategy and policy framework for the sustainable management of critical minerals, aligned with India's decarbonization and industrialization goals.

### Conclusion

- Through these measures, India can address its challenges with critical minerals and strengthen its resilience to supply chain disruptions while advancing its sustainable development and decarbonization agenda.

## 8) Suboptimal Use of Labour Force in India

*(GS-II: Issues Relating to Development and Management of Social Sector/Services relating to Health, Education, Human Resources)*

### Context:

- A vast majority of Indians earn the entirety of their incomes through labour as opposed to ownership of capital or land.
- Further, about 90% of the working Indian population earns its livelihood through informal employment that is characterised by little or no job security, no employment benefits, no social protection, and lower earnings.
- At this juncture, exploring the efficiency of labourers engaged in informal employment becomes necessary.

### Reasons for Suboptimal use of labour in India:

- **Low-Quality Jobs:** A significant portion of the workforce is engaged in low-quality self-employment, particularly unpaid family work, which offers limited prospects for income growth and economic advancement.
- **Stagnant Earnings:** Despite some increases in average daily earnings for certain segments, overall earnings for many workers have stagnated or shown minimal growth, indicating a lack of upward mobility and economic progress.
  - At the most aggregate level, the all-India average real daily earnings increased by around ₹10 (in 2010 prices) between 2017-18 and 2021-22, about a 4% increase.
- **Lack of Skill Development:** Limited access to education and skill development programs restricts the ability of workers to access higher-paying and more productive employment opportunities.

- **Structural Barriers:** Structural barriers, such as caste, gender, and geographic disparities, hinder equitable access to employment and economic opportunities, perpetuating inequality and limiting labour market efficiency.
- **Informal Sector Dominance:** The predominance of the informal sector in the Indian economy, which comprises a significant portion of low-productivity jobs, constraints overall productivity and economic growth.
- **Insufficient Investment:** Insufficient investment in infrastructure, technology, and human capital development hampers the creation of high-quality jobs and limits the potential for labour productivity gains.
- **Lack of Labor Market Reforms:** Inadequate labour market reforms, including rigid labour laws and regulations, hinder job creation, investment, and innovation, limiting the dynamism and efficiency of the labour market.

#### Measures to address this problem:

- **Investment in Education and Skill Development:** Implementing policies to enhance access to quality education and vocational training programs can equip the workforce with the skills needed to access higher-paying and more productive employment opportunities. This includes promoting technical and vocational education, as well as fostering lifelong learning initiatives to adapt to evolving job market demands.
- **Promotion of Formal Employment:** Introducing measures to **incentivize** formal employment, such as **tax breaks or subsidies** for formal sector employers, can help shift workers from the informal to the formal

sector. This can improve job security, access to benefits, and social protection for workers, ultimately enhancing labour productivity and economic growth.

- **Labour Market Reforms:** Undertaking labour market reforms to address rigid labour laws and regulations can facilitate ease of doing business and promote job creation. This may involve streamlining labour regulations, introducing flexible employment arrangements, and promoting labour market flexibility while ensuring adequate protection for workers' rights.
- **Investment in Infrastructure and Technology:** Increasing investment in infrastructure development, including transportation, communication, and digital infrastructure, can create employment opportunities and enhance labour productivity. Additionally, promoting the adoption of technology and innovation in key sectors can drive productivity gains and create high-quality jobs, particularly in sectors such as manufacturing, agriculture, and services.

#### Conclusion

- India is in its period of demographic dividend which is expected to peak in less than 20 years and exhaust in roughly another 30 to 35 years. In this golden period of reaping labour productivity, taking adequate measures to address these issues becomes a necessity.

## 9) Nutritional Literacy

*(GS-II: Issues relating to Poverty and Hunger)*

#### Context:

- The recently released Household Consumer Expenditure Survey (HCES) data for 2022-23 by the Ministry of Statistics and Programme implementation points to a shift in the food consumption pattern of Indian households.
- The good news is that for the first time the **share of expenditure on food for rural households has come down to less than 50 per cent.**
- The average monthly per capita expenditure (MPCE) was Rs 3,773 for rural and Rs 6,459 for urban households. The percentage share of food and non-food items was 46 per cent and 54 per cent for rural and 39 per cent and 61 per cent for urban areas, respectively.

#### Shift in Consumption pattern:

- **Drastic Decrease spending on cereals:** The percentage share of expenditure on cereals (as a percentage of overall expenditure) stood at 22 percent for rural and 12 percent for urban areas in 1999-2000 while the present data shows it to be at 4.9 percent and 3.6 percent respectively.
- **Considerable Increase in Processed food consumption:** Beverages, refreshments and processed foods have a share of expenditure at 9.6 percent and 10.6 percent respectively for rural and urban areas.
  - Processed foods, known for high sugar and salt content, are not a healthy choice. This is a new development and it is striking that the proportion of processed food consumed in rural and urban areas is very similar.
- **Increased spending on Milk products:** Milk and milk products at 8.3 percent and 7.2 percent

respectively for rural and urban areas have

- **Drop in spending for Pulses:** The consumption of pulses is the lowest with the average MPCE being 2 per cent and 1.4 per cent for rural and urban respectively. The cultivation of pulses has declined substantially with a corresponding increase in cost, which could have led to a decline in consumption levels.
- **Drop in expenditure for Vegetables** and small rise in expenditure on **meat and fish.** Share of expenditure on fruits and edible oil is almost the same and there is practically no difference between rural and urban consumers. **Sugar and salt** account for less than 1 per cent of the total share of expenses on food.

#### Idea of Nutritional literacy:

- Nutritional literacy refers to the knowledge, understanding, and skills individuals possess regarding nutrition and dietary practices.
- It encompasses a range of competencies related to making informed food choices, understanding nutritional information, and adopting healthy eating habits.

#### Need for Nutritional Literacy:

- **Promotion of Healthier Dietary Choices:** Nutritional literacy equips individuals with the knowledge and skills to make informed decisions about their diet. With a better understanding of nutrition, people are more likely to choose nutrient-dense foods over unhealthy options, leading to improved overall health and well-being.
- **Prevention of Diet-Related Diseases:** Many chronic diseases, such as obesity, diabetes, cardiovascular disease, and certain cancers, are closely linked to dietary factors. Nutritional literacy

helps individuals recognize the impact of diet on health outcomes and empowers them to adopt dietary habits that reduce the risk of developing these conditions.

- **Management of Weight and Body Composition:** Nutritional literacy enables individuals to make choices that support weight loss, weight maintenance, or muscle gain, depending on their goals and needs.
- **Improved Public Health Outcomes:** By promoting nutritional literacy across communities, public health initiatives can achieve broader population-level health improvements, like reducing the prevalence of malnutrition and micronutrient deficiencies.
- **Empowerment and Personal Responsibility:** By understanding the nutritional content of foods, interpreting food labels, and critically evaluating dietary information, individuals can take proactive steps towards optimising their health and well-being. This sense of personal responsibility fosters a positive attitude towards health and personality.

### Conclusion

- These points show the importance of nutritional literacy among the Indian population. The time is ripe to take measures like **Front-of-pack food labelling indicating high salt, fat or sugar content, Tax on High fat, sugar and salt(HFSS) foods,-** etc. A study commissioned by the Niti Aayog recommended a 20 percent to 30 percent health tax in addition to GST on high fat, sugar and salt (HFSS) foods.

## 10) Problems of Tribals in India

*(GS-II: Welfare Schemes for Vulnerable Sections of the population by the Centre and States and the Performance of these Schemes; Mechanisms, Laws, Institutions and Bodies constituted for the Protection and Betterment of these Vulnerable Sections)*

### Context:

- Tribals in India still face several problems which range from Rights to land to lack of social empowerment.

### Problems faced by Tribals in India:

- **Land Rights and Displacement:** Tribes often face challenges in securing their traditional land rights, leading to displacement due to large-scale development projects like mining, dams, and infrastructure expansion.
- **Lack of Access to Basic Services:** Many tribal communities lack access to basic amenities such as clean water, healthcare, education, and sanitation. This results in poor health outcomes, limited educational opportunities, and overall lower quality of life.
- **Marginalisation and Discrimination:** Tribes often experience marginalisation and discrimination, both socially and economically. They may face prejudice and stereotyping, hindering their access to employment opportunities, education, and other resources.
- **Loss of Traditional Livelihoods:** Rapid socio-economic changes, coupled with environmental degradation, threaten traditional tribal livelihoods such as hunting, gathering, and agriculture. This loss of livelihood leads to increased poverty and dependency on external sources for sustenance.
- **Cultural Erosion and Identity Crisis:** Globalisation,

modernization, and urbanisation contribute to the erosion of tribal cultures and traditions. Language loss, changes in social norms, and the influence of mainstream culture often result in an identity crisis among tribal communities, impacting their sense of belonging and cultural pride.

- **Limited awareness** in getting the rights and entitlements provided by the Governments at different levels.

#### Measures taken by the Government to address the problems of Tribals:

- **Constitutional safeguards** like the Fundamental rights, National Commission for Scheduled Tribes, Schedule 5 and Schedule 6 are given for tribal people.
- **Legislations: Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (In short FRA)** was enacted by the Parliament to recognize and vest forest rights in the Forest Dwelling Scheduled Tribes and Other Traditional Forest Dwellers who have been residing in forest land for generations, but whose rights on ancestral lands and their habitat were not adequately recognized resulting in historical injustice to them.
- **Educational Empowerment:** Eklavya Model Residential Schools (EMRS) have been set up to provide quality education to ST students (Class VI-XII) in remote areas through residential schooling facilities.
- **Economic Empowerment:** Under the **Pradhan Mantri Vanbandhu Vikas Yojana**, a venture capital fund has been set up to promote entrepreneurship/start-up projects by ST youth.
  - **TRIFED** (Tribal Cooperative Marketing Development

Federation of India) supports retail marketing for livelihood development among tribal communities of India.

- **Minimum Support Price (MSP)** is ensured for Minor Forest Produce, and marketing support for tribal products is provided through the **Pradhan Mantri Jan Jatiya Vikas Mission**.
- **Improved Infrastructure and Livelihood Opportunities:** The Pradhan Mantri Adi Adarsh Gram Yojana (**PMAAGY**) aims to provide basic infrastructure in villages with a significant tribal population.
- **Pradhan Mantri Janjati Adivasi Nyaya Maha Abhiyan (PM-JANMAN)** to saturate the Particularly Vulnerable Tribal Groups (PVTG) families and habitations with basic facilities such as safe housing, clean drinking water and sanitation, improved access to education, health and nutrition, road and telecom connectivity and sustainable livelihood opportunities.
- **National Sickle Cell Elimination Mission** to be implemented jointly by the Ministry of Health and Family Welfare and **Ministry of Tribal Affairs** in collaboration with ICMR and States concerned. The Mission will cover preventive, curative and management aspects of this genetic disease in an integrated manner.
- Under **Development Action Plan for Scheduled Tribes (DAPST)**, besides Ministry of Tribal Affairs, **41 Ministries/ Departments are allocating funds** in the range of 4.3 to 17.5 per cent of their total scheme allocation every year for tribal development projects

relating to education, health, agriculture, irrigation, roads, housing, electrification, employment generation, skill development, etc.

### Conclusion

All these initiatives, along with other steps taken by the government, have paved the path of bringing the tribal communities into the mainstream while honouring their cultures, legacies and ways of life.

## 11) Judges into Politics

*(GS-II: Separation of Powers between various organs Dispute Redressal Mechanisms and Institutions)*

### Context:

- A judge of the Calcutta High Court recently resigned and joined a national party.
- This calls for an examination into the events of political entry of judges.

### Issues in Judges joining Political parties:

- **Threat to Judicial Independence:** When judges transition into politics, it can undermine the principle of judicial independence. Judicial decisions should ideally be free from political influence or bias. However, when judges enter the political arena, there's a risk that their decisions on the bench may be perceived as influenced by their political affiliations or aspirations.
- **Erosion of Public Trust:** The judiciary is a pillar of democracy, and public trust in its impartiality and integrity is crucial. When judges join political parties or engage in partisan politics, it can erode public trust in the judiciary. People may perceive judicial decisions as driven by political motives rather than legal principles, leading to a loss of faith in the justice system.

- **Conflict of Interest:** Judges are expected to remain impartial and avoid conflicts of interest. However, when they enter politics, they may find themselves in situations where their political interests clash with their judicial duties. This can create ethical dilemmas and compromise the integrity of the judicial process.
- **Politicisation of the Judiciary:** The entry of judges into politics can lead to the politicisation of the judiciary. Instead of being perceived as impartial arbiters of the law, judges may be viewed as political actors with partisan agendas. This can undermine the credibility of the judiciary and weaken its ability to serve as a check on governmental power.

### Ways to address the issue:

- **Ethical Guidelines and Codes of Conduct:** Establish clear ethical guidelines and codes of conduct for judges that explicitly prohibit them from engaging in political activities, including joining political parties or running for political office. These guidelines should emphasise the importance of judicial independence and impartiality and outline the consequences for violations.
- **Cooling-off Periods:** Implement mandatory cooling-off periods for judges after they retire or resign from the bench before they can engage in political activities. This period would help mitigate the risk of judges immediately transitioning into politics and ensure that they have sufficient time to disassociate themselves from their judicial roles.
- **Post-Retirement Restrictions:** Enact legislation or regulations that impose restrictions on post-retirement activities for judges, particularly in relation to political

involvement. This could include prohibiting judges from holding political office or engaging in partisan activities for a certain period after their retirement to uphold the integrity of the judiciary.

- **Judicial Oversight and Accountability:** Strengthen mechanisms for judicial oversight and accountability to monitor judges' conduct and address any instances of inappropriate political involvement. This could involve establishing independent judicial oversight bodies or empowering existing judicial councils to investigate complaints and take disciplinary action against judges who violate ethical standards or engage in political activities.

#### **Bangalore Declaration:**

- The **Bangalore Principles of Judicial Conduct (2002)** are a set of principles intended to establish **standards for ethical conduct of judges**. They are designed to provide guidance to judges and to offer the judiciary a framework for regulating judicial conduct.
- The declaration enlists **six core judicial values including independence, impartiality, integrity, propriety, equality, competence and diligence**.
- It emphasises the **need to eradicate bias or prejudice** in the decision-making process.
- It asks judges to ensure that their conduct "both in and out of (the) court maintains and enhances the confidence of the public, the legal profession, and litigants in the impartiality of the judge and of the judiciary".
- Clause 2.4 of the declaration is against the judge making comments "that might reasonably

be expected to affect the outcome of (a case)."

- It says that the **"judge shall disqualify himself or herself from participating in any proceedings in which the judge is unable to decide the matter impartially"**.
- The Code also says, "A judge shall conduct himself or herself in a way that is consistent with the dignity of the judicial office"

#### **Conclusion**

This case gives an opportunity to the Chief Justice of India and the Supreme Court to investigate the matter more seriously and evolve methods to avert such judicial aberrations.

## **12) Student Engagement and Educational Outcomes**

*(GS-II: Issues Relating to Development and Management of Social Sector/Services relating to Health, Education, Human Resources)*

#### **Context:**

- The Annual Status of Education Report 2023 states that more than 86.8% individuals in the age group of 14-18 are enrolled in educational institutions, but one-fourth of them cannot read a Class 2-level text fluently in their regional languages.
- This shows that even though high enrollment has been attained, educational outcomes are not achieved.
- One of the reasons listed for this problem is the inadequate teacher-student interactions. Teaching in India has become a one sided seminar rather than interaction between the two stakeholders.

#### **Importance of Student-Teacher interaction:**

- **Enhanced Learning Outcomes:** Active engagement of students in the learning process leads to



improved academic performance and better retention of knowledge.

- **Meaningful Learning Experiences:** Engaged students are more likely to find relevance and value in their studies, leading to deeper understanding and application of concepts.
- **Increased Motivation:** When students are actively involved in their learning, they are more motivated to participate, take ownership of their education, and pursue academic goals.
- **Development of Critical Skills:** Student engagement fosters the development of critical thinking, problem-solving, and communication skills, which are essential for success in academic and real-world contexts.
- **Positive Classroom Environment:** Engaged classrooms are characterised by enthusiasm, collaboration, and mutual respect among students and teachers, creating a conducive learning environment for all.
- **Reduced Behavioural Issues:** Actively engaged students are less likely to exhibit disruptive behaviour or disengagement, leading to a more productive and harmonious classroom atmosphere.
- **Promotion of Equity and Inclusion:** Student engagement initiatives ensure that all students, regardless of background or ability, have opportunities to participate and succeed in their education.
- **Preparation for Future Challenges:** By encouraging active learning and engagement, schools equip students with the skills and mindset necessary to adapt to evolving challenges in their academic and professional lives.

### Measures to Improve Teacher-Student interaction:

- **Initial Teacher Training:** Expose teachers to interactive teaching methods that involve students actively right from the teacher education period. This could include group discussions, problem-solving activities, and hands-on experiments.
- **Continuous Professional Development:** Provide teachers with ongoing training and support focused on effective engagement strategies. This can include workshops, seminars, and peer mentoring programs aimed at enhancing teaching skills and classroom management techniques.
- **Use of Technology:** Integrate technology into the classroom to create more engaging learning experiences. This could involve the use of educational software, multimedia resources, and interactive whiteboards to capture students' interest and facilitate active participation.
- **Collaborative Learning Environments:** Foster a collaborative learning environment where students work together on projects, share ideas, and learn from each other. This can promote peer-to-peer engagement and encourage students to take ownership of their learning.
- **Differentiated Instruction:** Recognize and accommodate the diverse learning needs and styles of students by implementing differentiated instruction techniques. This involves tailoring teaching methods, materials, and assessments to accommodate individual differences and maximise student engagement.
- **Feedback Mechanisms:** Establish feedback mechanisms that allow students to provide input on their learning experiences. This can help

teachers tailor their instruction to better meet the needs and preferences of their students.

### Conclusion

- In India, we have spent a few years discussing the Right to Education but this is a good time to shift the focus to the Right to Learning. This approach coupled with Government of India measures like New Education Policy (NEP) can help in improving the learning outcomes.

## 13) Farm Protests in Punjab - An overview

*(GS-III: Issues related to Direct and Indirect Farm Subsidies and Minimum Support Prices; Public Distribution System - Objectives, Functioning, Limitations, Revamping; Issues of Buffer Stocks and Food Security; Technology Missions; Economics of Animal-Rearing)*

### Context:

- More than one month has passed since Punjab's farmers began their protests in February. The primary demand revolves around securing a legal guarantee for Minimum Support Price (MSP) on 23 crops.
- Despite anticipated hurdles in implementing such legislation, if farmers were assured MSP for all crops, is it profitable?

### Problems in Punjab's agriculture:

- **Limited Crop Diversity:** Lack of crop diversity beyond rice and wheat limits income opportunities for farmers and increases vulnerability to market fluctuations, soil health deterioration, and environmental challenges.
  - Punjab, caught up in a rice-wheat system induced by the MSP regime and open-ended procurement, along with free power and highly subsidised fertilisers, **failed**

**to diversify to high-value agriculture.**

- **Dependency on Minimum Support Price (MSP):** Punjab farmers heavily depend on MSP for rice and wheat, leading to a reluctance to diversify into alternative crops that may not offer comparable profits or price stability.
- **Stagnating crop productivity:** Contrary to the popular belief, Punjab, known for its high physical productivity of rice and wheat, falls at number 13 amongst Indian states when it comes to **agri-value created — agri-GDP on a per ha basis.**
- **Water Scarcity and Groundwater Depletion:** Intensive cultivation of water-intensive crops like rice exacerbates water scarcity issues and contributes to groundwater depletion, posing a long-term threat to agricultural sustainability.
  - Today, 84 percent of Punjab's GCA is under wheat and rice, leading to 76 percent of its blocks being over-exploited in terms of groundwater.
- **Land Degradation and Soil Health Decline:** Continuous cultivation of rice & wheat with high fertiliser usage and without adequate crop rotation and soil management practices leads to land degradation, soil erosion, and declining soil health.
- **Inefficient Resource Utilisation:** Inefficient use of resources such as water, fertilisers, and energy in rice-wheat cultivation further exacerbates environmental challenges and reduces agricultural productivity. Inadequate innovation
- Crop diversity is prescribed as the to go solution for Punjab's

agricultural problems but **some factors hinder the process of diversification.**

#### **Factors hindering Punjab farmers to diversify their agriculture:**

- **Government Support:** Punjab farmers heavily rely on Minimum Support Price (MSP) for rice and wheat, which are procured without any limits, leading to a reluctance to diversify as these crops ensure stable income. This is backed by free power and highly subsidised fertiliser supply.
- **Cropping Pattern Inertia:** Long-standing tradition of rice-wheat cropping pattern reinforced by government procurement policies has ingrained a resistance to change among farmers.
  - Cultural and institutional barriers, along with this resistance, impede efforts to diversify Punjab's agriculture and transition to more sustainable and resilient farming systems.
- **Economic Viability Concerns:** Despite potential environmental benefits and government incentives, many alternative crops do not offer comparable profits to rice cultivation, discouraging farmers from diversification.
  - Based on an analysis, it emerges that even with MSP assurance on all 23 crops, replacing paddy with another kharif crop would lead to revenue loss for Punjab farmers under current circumstances.
- **Infrastructure and Market Access:** Limited infrastructure and market access for alternative crops hinder farmers' ability to switch to high-value agriculture.

#### **Measures to motivate Punjab farmers to diversify agriculture:**

- **Focus on higher productivity:** Prioritise agricultural research and extension services to improve crop yields for alternative crops, making them more economically viable for farmers.
  - A substantial 30-40 per cent increase in crop yields could transform this landscape and make non-paddy crop combinations profitable too.
- **Innovative financial Incentives:** Provide **gap funding** or bonuses beyond MSP, including a **water-saving premium**, to bridge income gaps for farmers transitioning to alternative crops.
- **Promotion of Allied Activities:** Encourage diversification into allied activities such as **livestock farming**, poultry, and inland fishing to provide additional income sources for farmers. Punjab can build its already **strong dairy sector** as a means to diversify.
- **Strategic MSP Boosts:** Align future MSP hikes with a broader vision for agricultural production, **prioritising crops like millets, pulses, and oilseeds** to incentivize diversification towards more sustainable and climate-resilient crops.
- **Infrastructure Development:** Invest in infrastructure development and market linkages for alternative crops to facilitate their adoption by farmers and ensure profitable marketing opportunities.
- **Awareness and Training:** Conduct awareness campaigns and provide training programs to educate farmers about the benefits of diversification and innovative agricultural practices.

#### **Conclusion**

- The path towards revitalising Indian agriculture and boosting

farmers' incomes requires moving beyond traditional staples. Punjab and Haryana need to embrace a demand-driven high-value agricultural system, if they truly want their farmers to be prosperous.

## 14) India-Bhutan Relations

*(GS-II: India and its Neighborhood-Relations)*

### Context:

- Prime Minister Narendra Modi received Bhutan's highest civilian award, the '**Order of the Druk Gyalpo,**' the first foreign Head of the Government to receive the honour.
- The award has been conferred to Prime Minister Modi in recognition of "his outstanding contribution to the growth of India-Bhutan relations and for his distinguished service to the Bhutanese nation and people."

### Factors which had strengthened India-Bhutan relations:

- The basic framework of India-Bhutan bilateral relations is the **Treaty of Friendship and Cooperation** signed in 1949 between the two countries and revised in February 2007.
- **Respect and Equality:** India and Bhutan share a unique and time tested bilateral relationship, characterised by utmost trust, equality, goodwill and mutual understanding. The special relationship has been sustained by a tradition of regular high level visits and dialogues between the two countries.
- **Cultural and Religious Affinity:** India respects Bhutan's unique religious practices and cultural identity based on Buddhism fosters a deep cultural affinity between the two countries.

- A number of Bhutanese pilgrims travel to holy Buddhist sites in India. Reflecting the special nature of the relationship, the two countries share an open border with regular exchange of travellers in both directions for work, tourism, shopping, medical care etc.
- **Economic Cooperation:** India has supported Bhutan's economic development through various means, including hydropower cooperation, development assistance, and investment partnerships.
  - India has been extending economic assistance to Bhutan's socio-economic development since the early 1960s when **Bhutan launched its Five Year Plans.**
  - India continues to be the principal development partner of Bhutan. For the **12th Five Year Plan**, India's contribution of Rs. 5000 cr. will constitute more than 80% of Bhutan's total external grant component.
- **Hydropower Cooperation:** Mutually beneficial hydro-power cooperation with Bhutan forms the core of bilateral economic cooperation.
  - For **Bhutan**, hydro-power development continues to be a **vital catalyst for socio-economic development.** The ongoing cooperation between India and Bhutan in the hydro-power sector is covered under the 2006 bilateral agreement for cooperation

and its Protocol signed in 2009.

- Four hydro-electric projects (HEPs) totaling 2136 MW are already operational in Bhutan and are supplying electricity to India. The 720 MW **Mangdechhu** was commissioned in August 2019.
- Two HEPs namely, 1200 MW **Punatsangchhu-I**, 1020 MW **Punatsangchhu-II** in Inter-Governmental mode and Kholongchhu HEP (600 MWs) under the joint venture mode are under various stages of implementation
- **Leadership Trust:** There is a unique level of trust between the leadership of both countries, as evidenced by regular high-level visits and dialogue.
- **Cultural Exchange and Education:** Cultural exchange programs and educational opportunities have further strengthened people-to-people ties between the two nations.
  - India is the most popular educational destination for Bhutanese students -almost 4000 Bhutanese students are enrolled in Indian Universities at any time, many of whom are also provided scholarships by Govt. of India.
- **Geopolitical Considerations:** Both countries share common geopolitical interests and have cooperated on regional and international issues.
- **Shared Values:** India and Bhutan share common values such as democracy, peace, and stability, which have contributed to the

strengthening of their bilateral relation.

#### **Steps to Strengthen the Cooperation:**

- **Speeding up the pending hydro power plants** which can help both the nations. Here, it is time to acknowledge shortcomings in the current model and there is a need to go back to the drawing board to work out a more practical and potentially successful new model for hydro projects.
- **Cooperation and support for the Gelephu project:** Through this project, Bhutan aims to establish a **Mindfulness City** in southern Bhutan. This city is envisioned as a Special Economic Zone designed to attract foreign investment and promote prosperity in Bhutan, with a particular emphasis on sustainability, well-being, and environmental concerns.
  - The project seeks to elevate the income levels of Bhutanese citizens while addressing any potential impacts on Bhutan's status as a carbon-negative country.
- **Sustainable Tourism and transportation links** should be developed between the countries. It should not affect the environmental concerns of Bhutan and its people.
  - Faster development of the railway links will also enhance the cooperation.

#### **Conclusion**

Prime Minister Narendra Modi, on his last visit, assured Bhutan's top leadership that India will stand by the Himalayan kingdom in its quest for development and that their unique bilateral ties would create avenues for greater cooperation in connectivity, infrastructure, trade and energy sectors.

He also added that as a part of India's 'Neighbourhood First' Policy New Delhi will provide support of Rs 10,000 crore to Thimphu over next five years. Proper measures in this direction will ensure a win-win cooperation between India and Bhutan.

## 15) Non Personal Data and its Exchange Platforms

*(GS-III: Awareness in the fields of IT, Space, Computers, Robotics, Nano-technology, Bio-technology and issues relating to Intellectual Property Rights)*

### Context

- Rapid digitisation of government operations is accompanied by increasing volumes of citizen data. Such data is typically of two kinds — **Personal Data** and **Non-Personal Data (NPD)**.
- **Any data which is not personal data** (data pertaining to characteristics, traits or attributes of identity, which can be used to identify an individual) is categorised as non-personal data.
- In terms of origin, non-personal data can be **data which is never related to natural persons** (such as data on weather or supply chains), or **data which was initially personal data, but has been anonymised** (through use of certain techniques to ensure that individuals to whom the data relates to cannot be identified).
- Non-personal data can further be **classified** as:
  - **Public non-personal data:** Data collected or generated by the government in the course of publicly funded works. For example, anonymised data of land records or vehicle registration can be considered as public non-personal data.

- **Community non-personal data:** Raw or factual data (without any processing) which is sourced from a community of natural persons. For example, datasets collected by municipal corporations or public electric utilities.
- **Private non-personal data:** Data which is collected or generated by private entities through privately owned processes (derived insights, algorithms or proprietary knowledge).

- Regulation of NPD in India is very less as compared to the personal data. To fill this gap, the Ministry of Electronics and Information Technology (MeiTY) released the draft **National Data Governance Framework Policy (NPD Framework)** which was touted as the first building block of the digital architecture being conceived to maximise data-driven governance.

### Applications of Non-Personal Data (NPD):

- **Urban Planning:** Analysing NPD related to infrastructure usage, mobility patterns, and housing trends to optimise city planning and development.
- **Disaster Management:** Utilising NPD such as meteorological data to forecast and prepare for natural disasters, ensuring effective response and mitigation strategies.
- **Public Health:** Leveraging NPD on disease outbreaks, healthcare access, and demographic trends to enhance public health policies and resource allocation.
- **Employment Policies:** Analysing NPD on employment trends, job vacancies, and skill requirements to formulate strategies for workforce development and job creation.

- **Transportation Management:** Using NPD on traffic flow, public transportation usage, and commuter patterns to improve transportation infrastructure and services for citizens.

#### Issues with the Draft NPD Framework:

- **Abstract Principles without Tangible Guidance:** The framework formulates abstract high-level principles and objectives for NPD governance but lacks tangible, actionable guidance to achieve them.
- **Lack of Legislation and Operationalization:** While legislation for NPD governance is expected, practical operationalization is overlooked, leaving questions unanswered regarding stakeholder rights and obligations across sectors.
- **Absence of Pricing Mechanisms:** Mechanisms for pricing of data and are not addressed in the framework.
- **Missing Standardised Governance Tools:** The absence of standardised governance tools compounds challenges in implementing the framework effectively.
- **Limited Scope for Inter-Sectoral Integration:** The framework's limitations hinder effective inter-sectoral integration of NPD, which is crucial for maximising its potential benefits.
- **Data Exchange issues:** Appropriate legal structures for data exchange are inadequate. This can lead to unprotected inter-flow of NPD across government departments, third-parties, and citizens causing inefficiencies and vulnerabilities.
- **Lack of Clarity on Stakeholder Rights and Obligations:** The framework lacks clarity on

stakeholder rights and obligations, which is essential for fostering trust and cooperation in data exchanges.

- **Inadequate Safeguards against Privacy Breaches:** The framework does not provide sufficient safeguards against privacy breaches, leaving sensitive aspects of NPD vulnerable, particularly in the context of increasing digitization of public services.
- **Need for Regulatory Design and Enforcement:** There is a need for a regulatory design for data exchanges in India to address these issues comprehensively and ensure effective governance of NPD.

#### What is Data Exchange? the process and the platform:

- Data exchange refers to the **process of sharing and transferring data** between different organisations, systems, or applications.
- It involves exchanging data in a structured format, typically using standardised protocols and interfaces, to enable seamless data integration and interoperability between disparate systems.
- **Data exchange platform is a software platform which facilitates the process of data exchange.**
- These exchanges serve as a centralised platform for companies to share, access, and monetize data assets with other organisations, while maintaining control over their data privacy and security.
- In India, the **State of Telangana** has designed an **agriculture data exchange**, while **India Urban Data Exchange** has been established by the **Ministry of Housing & Urban Affairs** in collaboration with the **Indian Institute of Science**. Similarly, the Department of

Science & Technology has announced its intention to set up data exchanges to implement aspects of the National Geospatial Policy.

#### Steps to address these concerns:

- Develop and operate a **comprehensive legislation** specifically addressing NPD governance, including clear guidelines for its collection, use, sharing, and protection.
- Define **pricing mechanisms for NPD** to ensure fair compensation for data contributors and encourage participation in data exchanges.
- Establish **legal structures for data exchange**, including frameworks for data ownership, licensing, and liability to facilitate secure and transparent data sharing.
- Strengthen **privacy and security safeguards** through robust encryption, anonymization, and data protection measures to safeguard sensitive information and uphold citizen trust in data exchanges.
- Foster **collaboration and partnerships** among different stakeholders for knowledge sharing, capacity building, and best practice exchange to maximise the value of NPD across diverse sectors and enhance decision-making processes.

#### Conclusion

- A critical evaluation of the NPD Framework to address the existing gaps will be beneficial. This will supplement MeITY's effort to regulate NPD and will help forge data exchanges as suitable media to make NPD interoperable across sectors.

## 16) Water Resources in India- Security or Scarcity?

*(GS-III: Conservation, Environmental Pollution and Degradation, Environmental Impact Assessment)*

#### Context:

- **World Water Day, which falls on March 22**, is a global initiative backed by the United Nations, and has been observed every year since 1993.
- Under different themes, the attempt has been to raise awareness among stakeholders about the importance of freshwater. **The UN's theme this year is "Leveraging Water for Peace"**.
- As everyone knows, there was a time when clean water was available in wells, ponds, streams, rivers and other sources, but the situation is vastly different now. There is a **problem of water availability with respect to quantity or quality**.

#### Problems in Achieving Water Security in India:

- **Water Scarcity:** India faces issues of water scarcity due to various factors such as rapid urbanisation, industrialization, unsustainable agricultural practices, and climate change.
  - According to the World Resources Institute(WRI), India faces 'extremely high' levels of water stress which is threatening to result in conflict, unrest and peace among people.
- **Groundwater Depletion:** Groundwater levels are depleting rapidly in many states, leading to concerns about long-term water availability.
  - The example of Bengaluru is one prominent example. In Punjab, Rajasthan, Delhi and



Haryana, the ratio of groundwater consumption to availability is 172%, 137%, 137% and 133%, respectively, which is cause for alarm.

- **Unequal Distribution:** There's a significant disparity in water availability and distribution between different regions and rural-urban areas.
  - Water access within and near home is high in urban areas but low in rural areas.
- **Water Quality:** Pollution from various sources such as industrial effluents, agricultural runoff, and untreated sewage is deteriorating the quality of water in rivers, lakes, and groundwater reservoirs.
- **Inefficient Water Management:** Inadequate infrastructure, poor maintenance of water bodies, and inefficient use of water resources contribute to the water crisis.
  - **72% of all water withdrawals are for use in agriculture**, which is known for **low water use efficiency**, followed by, 16% by municipalities for households and services, and 12% by industries.
- **Climate Change Impact:** Erratic rainfall patterns and extreme weather events exacerbate water scarcity and pose challenges for water management.
  - Rainfed regions in India which comprise over 48% of land area produces nearly 45% of the gross agricultural product. So, a large amount of India's food grains is from the rainfed region and erratic rainfall affects food security.
- **Problem of Water sharing:** These problems exist between different

states of India and between India and its neighbouring countries.

- Different states such as Karnataka, Tamil Nadu, Punjab, Haryana are entangled in water sharing issues.
- India has issues with Bangladesh, Nepal, Pakistan over water and flood management.

### Specific Impacts of Water insecurity on Women:

- **Time poverty:** In households whose principal water source lies outside their household premises, water collection is typically perceived as a gendered activity, with the **time burden of collecting water inevitably falling on women** and girls of the household.
- **Shortcomings in Education:** Water insecurity **affects the school attendance** and **academic performance** of girls.
- **Violence on women:** Women also face **gender based violence** during the commute for water collection, which has an adverse impact on their mental health.
- **Health issues:** Research suggests that lack of access to adequate water leads to the **practice of open defecation**. Apart from the health impacts like diarrhoea, typhoid and cholera, and impacts on **menstrual health**, women who practise open defecation also face psychosocial stress as well as a greater risk of **non-partner sexual violence**.

### Steps Taken by the Government:

- **National Water Mission:** The mission aims to **ensure integrated water resource management helping to conserve water, minimise wastage and ensure more equitable distribution both across and within states**.

- The Mission will develop a framework to optimise water use by increasing water use efficiency by 20% through regulatory mechanisms with **differential entitlements and pricing.**
- It will seek to address the water concerns of cities through solutions like **water recycling and sea water desalination.**
- **Jal Jeevan Mission** is envisioned to provide safe and adequate drinking water through **individual household tap connections by 2024 to all households in rural India.**
  - The programme will also implement source sustainability measures as mandatory elements, such as recharge and reuse through grey water management, water conservation, rain water harvesting.
  - The Jal Jeevan Mission will be based on a community approach to water and will include extensive Information, Education and communication as a key component of the mission.
- **Jal Shakti Abhiyan- Catch the Rain 2022(JSA-CTR 2022):** This campaign was started to spread awareness about the importance of water conservation and rainwater harvesting among the public in India.
- **The Atal Bhujal Yojana**, India's largest **community-led groundwater management program**, is helping improve rural livelihoods and build resilience in 7 Indian states which have the

highest rates of groundwater depletion.

- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** The government has launched schemes like PMKSY to **promote efficient water use in agriculture** through micro-irrigation techniques.

#### **Solutions to Address Water insecurity:**

- **Smart Water Management Systems:** Implementing IoT-based technologies for real-time monitoring and management of water resources can optimise water use and reduce wastage.
- **Revival of Water Bodies:** Efforts to revive and maintain water bodies like ponds, lakes, and wetlands to enhance water storage and recharge groundwater. This will be of great use in urban areas.
- **Groundwater use neutrality:** Taking steps to ensure that groundwater recharge is done adequately. This can arrest the fast depleting groundwater resources in India.
- **Reorientation of Agriculture:** Cropping pattern and crop selection in different areas should be reoriented in such a way to avoid a water crisis.
- **Community Participation:** Involving local communities in water management and conservation efforts can ensure sustainable usage and equitable distribution of water resources.
- **Water Pricing:** Implementing water pricing mechanisms based on usage can encourage efficient water use and discourage wastage.
- **Integrated Farming Systems:** Promoting integrated farming systems that optimise water use and crop selection can improve agricultural productivity while conserving water.

- **Desalination and Wastewater Reuse:** Investing in desalination plants and promoting safe reuse of treated wastewater can augment water supply and reduce pressure on freshwater sources.
- **Research and Innovation:** Encouraging research and innovation in water conservation technologies and practices can lead to novel solutions for addressing water scarcity and improving water management.

### Conclusion

- These solutions, on proper implementation can help strengthen the theme of World Water Day 2024 and can help India become water secure.

## 17) World Tuberculosis (TB) Day (GS-II: Issues Relating to Development and Management of Social Sector/Services relating to Health, Education, Human Resources)

### Context:

- World TB Day, on March 24, commemorates Dr. Robert Koch's discovery of Mycobacterium tuberculosis (the bacteria that causes tuberculosis) in 1882.
- Despite its discovery in 1882, possible treatments using streptomycin in 1943 and the discovery of antibiotics such as isoniazid and rifampicin in the 1950s and 1960s, the war against the pathogen is far from been won, and there are multiple challenges to be overcome in combating the disease.
- These challenges and a strategy to address them is the core of our literature.

### Disease Burden:

- Every day, 3,500 people worldwide lose their lives to tuberculosis (TB), and around 30,000 people become infected with TB bacilli, according

to World Health Organization (WHO) estimates.

- **India alone accounts for 27% of global TB cases.**
- The **theme for World TB Day 2024 (March 24), 'Yes! We can end TB!'**, underscores the potential to eradicate TB with existing disease control mechanisms, infrastructure, training, and the political will.
- Yet, TB in its various avatars; drug-resistant (DR-TB), totally drug-resistant (TDR-TB), extensively drug-resistant (XDR-TB), pulmonary TB (P-TB) and non-pulmonary TB seem hard to control.

### Challenges in addressing the TB burden:

- **Diagnostic Challenges:** Diagnosis remains a weak aspect of TB care, with a large gap between diagnosed and undiagnosed cases. Existing diagnostic methods have limitations, including high costs and accessibility issues.
- **Improper Treatment Adherence:** TB treatment requires long-term adherence, but non-compliance is common, leading to treatment failure and the development of drug resistance.
- **Drug Resistance:** Drug-resistant TB remains a challenge, exacerbated by poor regulatory mechanisms and non-compliance with treatment regimens.
- **Limited Access to Care:** Efficient and high-quality TB care, including diagnosis, treatment, and support, is not universally available, particularly in rural and underserved areas.
- **Drug Stock Outs:** Reports of drug stockouts are troubling and unacceptable, affecting the continuity of care for TB patients.

- **Stigma and Discrimination:** TB patients often face stigma and discrimination, which hinders their access to care and adherence to treatment.
- **Systematic Weaknesses:** There are weaknesses in the health system, including challenges in referral networks, real-time data capture, and integration of TB care into larger health systems.
- **Over-Medicalization and Lack of Holistic Approach:** TB has often been over-medicalized, neglecting its social, economic, and environmental dimensions. There's a need for a more holistic approach that considers the socio-economic determinants of TB.

#### Government Measures to Control TB:

- **National Tuberculosis Elimination Programme (NTEP):** NTEP is the flagship program of the Government of India for TB control. It aims to achieve universal access to TB care, reduce TB mortality and morbidity, and prevent the spread of TB in the community.
  - It implemented the internationally recommended **Directly Observed Treatment, Short-course (DOTS) strategy.**
- **Pradhan Mantri TB Mukht Bharat Abhiyan:** The Pradhan Mantri TB Mukht Bharat Abhiyaan has been envisioned to bring together all community stakeholders to support those on TB treatment and accelerate the country's progress towards TB elimination.
  - The Ni-kshay Mitra initiative forms a vital component of the Abhiyaan.
  - The Ni-kshay Mitra portal provides a platform for donors to provide various

forms of support to those undergoing TB treatment.

- The three pronged support includes nutritional, additional diagnostic, and vocational support.
- The donors, called Ni-kshay Mitras, could be a wide range of stakeholders from elected representatives, political parties, corporates, NGOs, and individuals.
- A macro view suggests that India has done exceptionally well so far. In fact, in November 2023, the World Health Organization (WHO) acknowledged India's success on two major fronts: in reducing TB incidence by 16% from 2015 to 2022 and in reducing TB mortality by 18% during the same period, keeping in line with the global trend.
- Going forward from this requires updating and strengthening of the current strategy.

#### Need of the Hour to control TB:

- **Early Detection:** Strengthen screening procedures, including the use of advanced technologies like X-ray imaging and molecular tests, to detect TB cases early.
  - Compulsory screening for family and contacts of each index case is essential, necessitating availability of laboratory facilities and efficient follow-up mechanisms within health systems.
- **Precise Treatment Categorization:** With increasing DR-TB, it is imperative to know the resistance status at the time of diagnosis to assign appropriate treatment regimens as per their phenotypic susceptibility.

- **Treatment Adherence and Follow-up:** Unlike other bacterial diseases, TB requires a long period of sustained treatment. Often, this leads to non-compliance, which could be due to observable improvement in health status, or change of residence, movement across States and districts.
  - Even though the TB control programme has a built-in follow-up system, compliance to complete treatment is not 100%. Leveraging technology to monitor compliance needs focus.
- **Controlling Drug Resistance:** Drug resistance in TB remains a man-made phenomenon. Unregulated use of antibiotics and non-compliance with treatment regimens lead to selective evolutionary pressure on the bacillus, in turn resulting in developing drug resistance.
  - Proper regulatory mechanisms for drug control and non-compliance with treatment regimens are to be developed.
- **Enhanced Data Collection and analysis:** There needs to be data on the proportion of people diagnosed with TB who have rifampicin-resistant TB (RR-TB) and multidrug-resistant TB (MDR-TB), this is resistance to both rifampicin and isoniazid, collectively referred to as MDR/RR-TB.
  - This helps in better plan and design of the control programme, resource allocation for diagnosis, the treatment regime as well as availability of trained staff mandated for DR-TB.
- **Availability and accessibility of Treatment:** Assured and timely medicine supply and medical support should be available to all persons affected by the disease.
  - Public health facilities should be expanded to have a specific TB control facility.
- **Integration into larger health systems:** Strengthening referral networks within and **between different levels of public health systems and private health systems** is vital to ensure no symptomatic cases are lost, no patients miss their dosages and are non-compliant, and, importantly, the screening of contacts for all positive cases of pulmonary TB cases (DR or non-DR).
- **Dynamic notification system:** A robust notification system will ease the burden of health system personnel.
  - Ni-Kshay(Ni=End, Kshay=TB) is the web enabled patient management system for TB control under the National Tuberculosis Elimination Programme (NTEP). it requires improvements to capture real-time TB data between sectors, practitioners, time, and locations
- **Reducing Stigma and Discrimination:** Implement strategies to reduce stigma and discrimination against TB patients, promoting community acceptance and support.
- **Research and Innovation:** Continue investing in research and innovation to develop new diagnostic tools, treatment regimens, and vaccines for TB.

### Conclusion

- Ending the TB epidemic by 2030 is among the health targets of the United Nations' Sustainable

Development Goals. Last year, Prime Minister Narendra Modi said that India is working towards eliminating TB five years ahead of the global 2030 target. This ambitious goal needs enhanced strategy as explained above.

## 18) Shift in India's Foreign Policy language

*(GS-II: Bilateral, Regional and Global Groupings and Agreements involving India and/or affecting India's interests)*

### Context:

- In the last decade, the foreign policy language of India has moved from being defensive to defiant, and passive-aggressive to one that is more self-assured and assertive, emphasising national interests and global ambitions.

### Changes which show this shift:

- **Emphasis on Self-Confidence:** With the growing economy, India's diplomatic language has become more self-confident, reflecting its changing position in the international hierarchy.
- **Identification as a Leading Power:** There has been a decline in references to "strategic autonomy" over the last decade and India is increasingly referred to as a "leading power" and a "net security provider," indicating a more proactive role in shaping regional and global order.
- **Recognition of Greater Responsibilities:** India's growing aggregate power is seen as bringing greater responsibilities and opportunities to shape and maintain regional and global order.
- **Focus on Developmental Challenges:** Despite its growing power, India recognizes significant developmental challenges at home, such as low per capita income, economic inequality, and

environmental degradation, which influence its foreign policy stance.

- **Closer Alignment with the global powers:** Earlier, fear of losing strategic autonomy has kept India away from creating strategic links with global powers especially USA. Now, India has moved closer to the United States and also maintains close relationships with other powers, reflecting a shift in its foreign policy alignment.

### Phenomena which support this shift:

- **Idea of Indo Pacific:** The concept of the "Indo-Pacific," initially met with scepticism in Delhi, has now been **embraced as a cornerstone of India's foreign policy**, particularly in response to deteriorating relations with China and burgeoning strategic partnerships, notably with the United States. This has led to the establishment of the **Quad alliance**, comprising Australia, India, Japan, and the US.
- **Eurasian Initiatives:** Simultaneously, India's engagement with Eurasia has evolved, propelled by changing dynamics with **Russia, China, and the West**. While the **Shanghai Cooperation Organisation** initially dominated discussions on continental cooperation, India's focus has broadened to include Europe, reflecting a newfound emphasis on bilateral and regional relationships.
- **Renewed focus on all regions of Europe:** Europe, previously overlooked in Indian foreign relations, has gained significance, evident in high-level diplomatic exchanges and growing trade ties. Additionally, India's engagement with Europe extends **beyond traditional power centres** to include emerging regions such as

the **Nordic-Baltic coalition** and the Mediterranean.

### Conclusion

- The aggregate size of its economy gives India some of the critical attributes of a major power and only an overall development of the Indian economy can further increase India's diplomatic heft.

## 19) Student Suicide in India

*(GS-II: Issues Relating to Development and Management of Social Sector/Services relating to Health, Education, Human Resources)*

### Context:

- In 2022, according to data in the "Accidental Deaths and Suicides in India 2022" report by the National Crime Records Bureau (NCRB), over 13,044 Indian students ended their lives — 7.6% of the total suicide fatalities in that year.
- Another grim statistic was that the number of suicides (students) rose from 10,335 in 2019, to 12,526 in 2020, to 13,089 in 2021.
- With individuals under the age of 25 forming half of India's populace(53.7%), increasing student suicide numbers is a cause of concern.

### Major causes leading to student suicides:

- **Academic Pressure:** The intense competition and pressure to excel in exams like JEE and NEET lead to stress and anxiety among students. The weight of academic expectations, especially in a climate where job opportunities are limited, can become overwhelming.
- **Parental Expectations:** Many students face relentless pressure from their parents to achieve academic success, often without consideration for their own aspirations and interests. This parental pressure can lead to

feelings of humiliation, desperation, and inadequacy among students.

- **Endemic Discrimination:** Systemic discrimination faced by marginalised communities exacerbates the challenges students from these backgrounds face. This discrimination contributes to feelings of alienation and hopelessness among affected students.
- **Financial Constraints:** Financial limitations prevent many families, especially those in middle and lower-income brackets, from providing additional educational resources such as coaching and tuition. This lack of support adds to the pressure on students to succeed academically.
- **Neglect of Social and Emotional Well-being:** The relentless pursuit of academic excellence neglects students' social and emotional needs, leaving them vulnerable to mental health issues. The emphasis on scholastic achievement often leads students to sacrifice interpersonal relationships and other essential aspects of personal development.
- **Lack of Emotional Support:** Students may feel emotionally detached from their families due to parental control and societal expectations. The absence of strong emotional bonds exacerbates feelings of isolation and can contribute to mental health issues.
- **Inadequate Mental Health Support:** The education system often fails to provide the necessary emotional scaffolding and support for students facing mental health challenges. This lack of support exacerbates students' feelings of distress and hopelessness.
- **Socioeconomic Disparities:** Students from socioeconomically

underserved communities face systemic discrimination, further intensifying their hardships. The unequal access to resources and opportunities creates additional barriers to academic success and well-being.

### Government Measures to reduce student suicides:

- **National Suicide Prevention Strategy(2022):** The first of its kind in the country, with **time-bound action plans** and multi-sectoral collaborations to achieve reduction in suicide mortality by 10% by 2030.
  - The strategy broadly seeks to **establish effective surveillance mechanisms** for suicide within 2025, **establish psychiatric outpatient departments** that will provide suicide prevention services through the District Mental Health Programme in all districts within 2027, and to **integrate a mental well-being curriculum** in all educational institutions within 2030.
  - It envisages developing **guidelines for responsible media reporting of suicides**, and restricting access to means of suicide.
- **UMMEED Guidelines:** UMMEED(Understand, Motivate, Manage, Empathise, Empower, Develop) guidelines aim to serve as “directions to schools for enhancing sensitivity, understanding, and providing support in case of reported self-harm”.
  - Stressing the need for immediate response to a student exhibiting warning signs, or found attempting self-harm, the guidelines list

the actions that may be taken by an individual at the school, or the member of the wellness team on coming across such a case.

- **National Mental Health Policy(2014):** This policy has an objective to reduce risk and incidence of suicide and attempted suicide. It also strives to improve the overall mental health and well being of

### Measures needed to reduce Student Suicides:

- **Comprehensive Mental Health Support:** According to the National Suicide Prevention Strategy, **mental health support services** are to be setup in educational institutions, including counselling centres staffed with trained professionals. These services should offer confidential counselling and therapy sessions to students facing academic and personal challenges.
- **Sensitisation of different Stakeholders** starting from teachers, fellow students, food and accommodation providers, etc about the vulnerabilities of students affected by suicidal thoughts. These stakeholders through their regular contact with the concerned person can act fast to avoid a suicide attempt.
- **Destigmatisation of Mental health issues:** Launch nationwide awareness campaigns to destigmatize mental health issues and promote help-seeking behaviour among students. Incorporate mental health education into school curriculums to foster understanding and resilience from a young age.
- **Guidance Programs for Parents:** Provide workshops and resources for parents to better understand



the importance of emotional support and positive reinforcement for their children. Encourage open communication between parents and children to address academic pressures and expectations.

- **Emotional Well-being Initiatives:** Introduce holistic well-being programs focusing on mindfulness, stress management, and emotional intelligence. Offer extracurricular activities, such as art, music, and sports, to promote relaxation and social interaction among students.
- **Crisis Intervention Protocols:** Develop and implement protocols for timely intervention in crisis situations, including suicide prevention hotlines and emergency response teams. Ensure that students have access to immediate assistance and support during times of distress.
- **Policy Changes:** Advocate for policy reforms at the governmental level to address systemic issues contributing to student suicides, such as reducing the emphasis on high-stakes exams and promoting a more holistic approach to education. Ensure that educational policies prioritise student well-being and mental health.
- **Data based Research and Evaluation:** Investing in research initiatives and data driven approach to better understand the factors contributing to student suicides and evaluate the effectiveness of prevention strategies.

### Conclusion

- Implementing the above measures can create a supportive and nurturing environment for students, reducing the incidence of student suicides and promoting overall well-being.

## 20) India-Taiwan (Republic of China) Relations

*(GS-II: Effect of Policies and Politics of Developed and Developing Countries on India's interests, Indian Diaspora)*

### Background:

- India's relationship with the Republic of China (RoC) can be traced back to the World War II deployment of the 100,000-strong Chinese Expeditionary Force (CEF) for the defence of Burma.
- Mauled by the Japanese, the CEF withdrew to India, where a centre was opened in Ramgarh for its re-training and re-equipping by the Americans.
- In February 1942, when its **Chief Chiang Kai-shek visited Ramgarh**, he was invited by the **Indian National Congress to address its 53rd session** (underway in Ramgarh).
- While Chiang's visit was meant to convey China's solidarity with India in the fight against Japanese aggression, he also expressed **support for India's freedom struggle**.
- In June 1942, Gandhiji wrote to Chiang, conveying that the Allied war effort would be far better served if Churchill assured India of self-determination, under the Atlantic Charter. Chiang promptly wrote to US President Roosevelt pleading India's cause and seeking his intervention in the cause of "justice and equity."
- India recognised the People's Republic of China (PRC-mainland China) in 1950 and for years stood by a **"one China" policy**, without reciprocity from the Chinese about J&K and Arunachal.
- Though India-Taiwan relations have remained low-key because of apprehensions about China's adverse reaction, the two countries

established trade and cultural ties in 1995 — diplomatic representatives were posted in New Delhi and Taipei.

### Importance of India-Taiwan Relations for India:

- **Economic Cooperation:** India and Taiwan have significantly expanded trade since 2001, indicating a strong economic partnership. Cooperation includes the possibility of a free trade agreement and joint ventures in crucial sectors such as semiconductor manufacturing.
- **Strategic Interests:** India sees value in maintaining the status quo across the Taiwan Strait as it aligns with its interests. Any disruption, such as Chinese aggression against Taiwan, could have catastrophic consequences for India's economy and security.
- **Supply Chain Security:** India's industry and critical supply chains are increasingly reliant on Taiwan. Ensuring a peaceful status quo is essential to safeguard these supply chains and prevent disruptions in key sectors like electronics and pharmaceuticals.

### Policies to Pursue in India-Taiwan Relations:

- **Support for Status Quo:** India should actively work to maintain the current peaceful status quo across the Taiwan Strait, emphasising Taiwan's self-governing status without declaring independence.
- **Diplomatic Engagement:** India can engage in coordinated diplomatic efforts to oppose aggression against Taiwan, building international consensus against any disruptive actions by China.
- **Economic Cooperation:** Further deepening economic ties with Taiwan, including exploring trade

agreements and facilitating joint ventures in strategic sectors, can strengthen bilateral relations.

- **Information Support:** India can engage in active information operations to support the Taiwanese people, bolstering their resilience against external pressures.
- **Military Support:** While India is unlikely to directly engage in a conflict over Taiwan, it can provide support to U.S. forces in the Indian Ocean, enhancing deterrence against potential aggression in the region.
- **International Law and Narratives:** Utilising international law arguments and building narratives opposed to aggression can help deter China from resorting to military action against Taiwan.

### Conclusion

- Given a shared and ever-increasing threat from the PRC, there is a significant mutuality of interests between India and the RoC. Apart from the obvious benefits to be gained from the regular exchange of military intelligence, Taiwan's unique position as the world leader in semiconductors makes it a desirable friend and partner.

## 21) Opportunities from India-Africa Relations

*(GS-II: Bilateral, Regional and Global Groupings and Agreements involving India and/or affecting India's interests)*

### Context:

- In her recent visit to Mauritius, President Draupadi Murmu described the country as a key player in India's Africa outreach.
- As India navigates an evolving global landscape, a multifaceted relationship with Africa offers significant opportunities.

### Significant Opportunities from India's African Relationships:

- **Trade growth:** Indian investments in Africa reached \$98 billion in 2023, with trade totalling \$100 billion. Forty-two African countries are the second-largest recipients of all credit extended by India.
- **Soft power:** Around 200 developmental projects have been completed in the region. Indian social enterprises and NGOs are exporting low-cost, scalable solutions, from eco-friendly houses to rural women solar engineers.
- **Diplomatic cooperation:** Africa's influence in global forums will be important for India's vision for global governance. As the Global South houses three-fourths of humanity and over 39 per cent of the global GDP, there's a call to reform existing structures towards a more inclusive system focused on development. New Delhi's advocacy for the African Union in the G20 has found resonance.
- **Minerals and Critical minerals:** Africa, with 30 percent of the world's mineral reserves, is vital to power the energy transition. Given the geographical concentration of critical minerals, diversifying sources and fostering strategic partnerships with resource-rich nations are imperative for India's growth and national security.
- **Cooperation in Technical education:** Indian research institutes engaging with Africa's research community can facilitate the creation of solutions to address Global South challenges.
  - Given India's longstanding commitment to education and capacity building in Africa, New Delhi could revamp existing collaborations or establish

new ones with African technical organisations. This endeavour would bolster negotiation skills, training in project management, and devising industry-specific technical courses.

### Conclusion

- In this era of geopolitical competition and realignment, India's multifaceted relationship with African nations is poised for a fundamental transformation. As India's aspirations for the Global South take shape, leveraging historical partnerships with African countries remains imperative.

## 22) Women Self help groups

*(GS-II: Development Processes and the Development Industry — the Role of NGOs, SHGs, various groups and associations, donors, charities, institutional and other stakeholders)*

### Context

- In India, **women self-help groups** have been a source of **empowerment, fostering economic independence, social stature and community resilience.**
- By pooling resources, providing microfinance opportunities and promoting entrepreneurship, these groups have significantly contributed to the reduction of **poverty** and demonstrated a successful model of **grassroots development**

### Potential of Self Help Groups (SHGs) in India

- An **SHG** is a **community led and run initiative**, whose basic tenet is to ensure **economic opportunities** for its members, which in turn can lead to their **social and political upliftment.**

- India has around **12 million SHGs**, **88 percent** of which have only **women members**.
- The Union Budget for 2023- 24 also focuses on advancing SHGs and helping them grow into large producer enterprises for economic empowerment.
- The **potential** of SHGs was evident during the **covid-19** when SHG members were making covid-19 **protective equipment, masks and sanitisers**, educating people about the importance of **vaccination**, etc.
- During 2022-23, more than **169 million masks** have been produced by **SHGs** under the **Deendayal Antyodaya Yojana National Rural Livelihoods Mission**.

### SHGs in various sectors

- The **Rani mistris** (women masons) of Jharkhand, who built toilets to help the state become open defecation free reflects how occupational stereotypes have been broken through SHGs.
- **Bank sakhis** are women incharge of an SHGs banking and bookkeeping activities.
- **Pashu sakhis** are SHG members that are trained in the best practices of livestock rearing and advise farmers on the same.
- **Poshan sakhis** are critical in implementing Poshan Abhyan 2.0 for facilitating food and nutrition security in rural areas.

### Scope of SHGs

- **Economic survey 2022-23**, reveals that nearly **0.4 million** SHG members have been empowered through **training programmes** to transform them into community resource persons.
- Such **income-augmenting measures** and **livelihood**

**diversification** inspire and encourage more women to join SHGs , thereby providing **upward mobility**.

- SHG members also contribute to strong **social networks** and **stronger local institutions**, thus contributing to social capital.
- Socio-economic empowerment of SHGs facilitates attainment of **UN's 17 Sustainable Development Goals**, like **SDG 5 (gender equality)**, **SDG 16 (peace, justice and strong institutions)** , etc.

### Political Push

- SHGs are no longer just meagre beneficiaries of government schemes, but rather **institutions with bargaining power**.
- Many SHGs have started to **advocate for their rights** and, through pressure groups, have forayed into activism while **sustaining livelihoods**.
- Their strong social networks make them essential to political parties because of the **multiplier** and **demonstration effects** that help further consolidate the **women vote bank**.
- Despite the **33 percent reservation** for women in **panchayati raj institutions**, the problem of **sarpanch patis** or **proxy sarpanches** still exists.

### Way Forward

- The immense **human capital** of SHGs has a great potential to transform them into **national help groups**.
- **Political empowerment** of SHGs can guide the way forward for **holistic empowerment of women**.

## Model Questions

- 1) Discuss the potential benefits of digital farming techniques for Indian agriculture.
- 2) Analyze the challenges faced by Indian farmers in adopting organic farming and suggest specific policy measures the government can implement to promote organic farming.
- 3) Discuss the concept of vertical farming and its potential in addressing contemporary agricultural challenges.
- 4) Strengthening of relations between India and Mauritius are of benefit to both the countries. Explain.
- 5) India's Gaganyaan mission aims to put Indians in space. Elaborate.
- 6) Women's urban employment guarantee legislation is proposed as a solution to check the falling women employment. Critically analyse this proposal.
- 7) Critical minerals are in need for new age manufacturing needs. India has concerns in obtaining these minerals. Examine the statement and provide suitable solutions.
- 8) India's demographic dividend can be utilised only by addressing the problem of suboptimal labour use. Examine.
- 9) Elaborate on the idea of 'Nutritional literacy'.
- 10) The problems faced by tribals in India are varied and thus require comprehensive solutions. Explain.
- 11) Entry of judges into politics goes against the principle of separation of powers. Critically Examine.
- 12) Elaborate on the need of student-teacher interaction in India's education sector.
- 13) Farmer protests have increased in frequency in recent years. Critically analyse the reasons for this rise and provide practical solutions to address the same.
- 14) India's relation with Bhutan is strong and growing into a stronger one. Explain.
- 15) Define the concept of Non personal data and list its applications. Also mention ways to address the concerns in use of non personal data.
- 16) Achieving water security in India is slowed down by varied hurdles in India. In this context, explain the hurdles with ways to achieve it.
- 17) India alone accounts for 27% of global TB cases. In this context, explain the reasons for this high disease burden and elaborate on ways to address the disease burden.

- 18) Analyse the change in India's foreign policy language in the last decade.
- 19) National Crime Record Bureau data shows that student suicides are increasing in India. In this context, explain the causes leading to this problem. Also provide workable solutions to address this problem.
- 20) Good relations with the Republic of China (Taiwan) can be of value to both countries.
- 21) Cooperation with Africa can be beneficial to India across different sectors. Explain.
- 22) Examine the role of the SHGs in developmental activities and the measures taken by the Government of India to promote them.