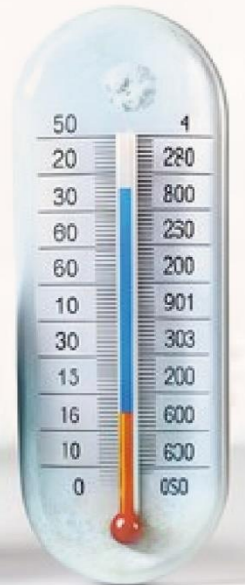


**MAY 2025** —

# BELIEVERS MANTRA



**INCLUDES**

**PRACTICE  
QUESTIONS  
PRELIMS**

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## INDEX

<b>GS 1</b> .....	<b>2</b>
Arun-3 Hydroelectric Project .....	3
Jarosite .....	3
Bharat Forecast System (BFS).....	4
Why has the monsoon come early this year? .	5
Egyptian Archaeologists Discover Three Tombs in Luxor .....	6
<b>GS 2</b> .....	<b>9</b>
Cabinet Committee on Security (CCS).....	9
FSSAI notified stricter rules for antibiotics in food items .....	9
Aqua Insurance .....	10
Bio-input Resource Centres (BRCs).....	11
Gyan Post.....	12
Indian Institute of Creative Technology (IICT) .....	12
India Extends \$200 Million Defence Credit Line to Angola .....	13
Supreme Court Ruling: Scope to Modify Arbitral Awards under Section 34 & 37.....	14
Nipah Resurfaces in Kerala District .....	15
Europe reviews Valneva's chikungunya vaccine.....	16
If Rohingya are foreign, Central govt. can deport them, says SC .....	16
History of the Rohingya Crisis .....	18
South Asia Press Freedom Report 2024–25	18
Caste Census in India: A Bold Step Towards Social Justice and Data-Driven Governance	20
Mizoram Declared India's First Fully Literate State .....	22
Bridging the Medical Oxygen Access Gap in South-East Asia: A Public Health and Governance Imperative.....	23
Bengaluru Floods Again: A Crisis of Urban Planning and Governance .....	25
India-Germany Strategic Partnership: Celebrating 25 Years.....	27
ECINET: ECI's Unified Digital Dashboard for Election Management .....	29
India-Pakistan Conflict: Strategic and Technological Dimensions.....	30

Centre asks States to raise enrolment in govt.  
schools .....

<b>GS 3</b> .....	<b>35</b>
India's Industrial Slowdown.....	35
Standing Deposit Facility (SDF) .....	37
Vultures .....	37
RNA-based antiviral agent .....	38
RBI issued guidelines on Microfinance Institutions (MFIs).....	39
India's First Genome-Edited Rice Varieties .	39
Climate Change and Human Gut Health: A New Path to Illness.....	41
India-UK Free Trade Agreement (FTA): Strategic and Economic Implications .....	43
Thalassemia: A Public Health Challenge.....	44
India's Demographic Transition: Insights from the SRS Report 2021 .....	46
Modal Shift in Transport – Changing Dynamics of Transportation in India and the World .....	48
WHO Pandemic Agreement .....	50
International Booker Prize 2025: Banu Mushtaq Becomes First Kannada Author to Win .....	51
PBAT (Polybutylene Adipate Terephthalate)	52
Supreme Court's Verdict on Ex-Post-Facto Environmental Clearance .....	53
Kerala Oil Spill Incident.....	55
Schistura densiclava .....	56
Mendel's Peas: The Origin of Genetics .....	57
The dawn of autonomous satellites .....	58
Conservation of Dugongs Must Remain a Top Priority for India .....	59
WMO Report: Global Warming Set to Breach 1.5°C Limit (2025–2029) .....	61
Autonomous Warfare in Operation Sindoor .	62

<b>Prelims Practice Questions</b> .....	<b>64</b>
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# GENERAL STUDIES - I

- 1. Art And Culture**
- 2. Modern History**
- 3. World History**
- 4. Indian Society**
- 5. Geography**

## GS 1

### Arun-3 Hydroelectric Project

#### Context:

- Recently, India and Nepal inaugurated the start of **electromechanical works** at the Arun-3 Hydroelectric Project.

#### About the Arun-3 Hydroelectric Project:

- It is located on the **Arun River** (a tributary of the **Kosi River**) in **Sankhuwasabha District** of Eastern Nepal.
- It is a **900 MW Run-of-River** hydroelectric project.
- It is being **developed with Indian assistance** at a cost of **Rs. 144 billion**.
- Being developed by **SJVN Arun-III Power Development Company (SAPDC)**, a subsidiary of India's **Satluj Jal Vidyut Nigam (SJVN)**.
- The project is based on the **Build-Own-Operate-Transfer (BOOT)** model for **30 years**, including 5 years for construction.
- Represents deepening **India-Nepal energy collaboration** and cross-border infrastructure partnership.

### Jarosite

- Researchers from India investigated **jarosite** samples from **Kachchh, Gujarat**—a region geologically analogous to **Mars**—to explore its potential use as a **natural**

**geochronometer** for planetary studies. This study focused on **luminescence dating** of the mineral to track geological events.

#### What is Jarosite?

- **Appearance:** Yellow-brown mineral
- **Composition:** Potassium (K), Iron (Fe), Sulphate (SO<sub>4</sub>)
- **Natural Occurrence:** Arid, saline environments on Earth; also found on **Mars** by missions like NASA's Opportunity Rover
- **Significance:** Indicates acidic, water-limited past environments; useful in astrobiology and planetary geology
- **New Insight:** Potential to serve as a “**natural clock**” via **radiation-induced luminescence**

#### Why Kachchh, Gujarat?

- **Terrain Features:** High aridity, salinity, and sedimentary features make Kachchh an ideal **Mars analog** site
- **Objective:** Study jarosite behavior in Martian-like conditions for extraplanetary research

#### Discovery of Jarosite in Antarctica

- **Location:** **Talos Dome, East Antarctica** (TALDICE ice core, ~5315 feet deep)
- **Research Team:** University of Milano-Bicocca, Italy
- **Objective:** Study minerals to understand ice age cycles

- **Discovery Method:**

- X-ray absorption
- Electron microscopy

- **Significance:** Unexpected presence of jarosite in deep ice layers suggests **chemical weathering** in extreme conditions

## Bharat Forecast System (BFS)

- **Developed by:** Indian Institute of Tropical Meteorology (IITM), Pune under the **Ministry of Earth Sciences (MoES)**
- **Purpose:** Improved short- (3 days) and medium-term (7 days) rainfall forecasting.
- Replaces IMD's older 12 km x 12 km grid model with **6 km x 6 km grid resolution** (4× improvement).
- India becomes the **only country globally** to provide **operational forecasts at such high resolution**.

### Relevance

GS Paper 1 (Geography)

- Monsoon, rainfall variability, weather systems in the tropics

GS Paper 3

- **Technology in governance:** Use of HPC, AI, and indigenous tech for public service
- **Disaster Management:** Early warning systems and resilience
- **Environment:** Climate adaptation strategies

### Reach and Accuracy

- Earlier: Forecasts available at **block level**.

- Now: Forecasts available **up to the panchayat level**, enabling **hyper-local weather warnings**.
- BFS improves accuracy in predicting **heavy rainfall**, crucial for agriculture, disaster response, and planning.

### Technological Advancements

1. Grid Innovation:

- Uses **Triangular-Cubic Octahedral (TCO) grid structure**, unlike traditional global grids.
- TCO increases resolution **especially in tropical zones**, where **weather variability is high**.

2. Indigenous Strength:

- Fully developed under **Atmanirbhar Bharat**, using **Indian scientific expertise and computing resources**.
- Potential to assist other **tropical countries** with complex monsoon and convection patterns.

3. Limitations & Enhancements

- **Current Limitation:** Limited in predicting **sudden severe thunderstorms**.
- **Upcoming Enhancement:**
  - **34 new Doppler Weather Radars** to be installed in 2025 (current: 53 radars).
  - Will support real-time monitoring and nowcasting.

### Supercomputing Backbone of BFS

Facility	Location	Performance	Storage
Arka	IITM, Pune	11.77 Peta FLOPS	33 Peta bytes

<b>Arunika</b>	NCMRWF, Delhi	8.24 Peta FLOPS	24 Peta bytes
<b>AI-ML System</b>	(Supporting BFS computations)	1.9 Peta FLOPS	—

- **1 PetaFLOP =  $10^{15}$  operations/second**

### Conclusion

- The **Bharat Forecast System (BFS)** marks a leap in India's meteorological capabilities, **bridging technology with grassroots impact**. From boosting **climate resilience in agriculture** to **disaster preparedness**, BFS is a significant stride in making forecasts **faster, finer, and more localised**.

## Why has the monsoon come early this year?

### Context

- The India Meteorological Department (IMD) confirmed that the **southwest monsoon arrived over Kerala on May 24, 2025**, a week earlier than the normal date of June 1. This is the **earliest onset since 2009**.

### Relevance:

- GS1 (Geography): Indian monsoon dynamics, climate change impacts.

## Why Has the Monsoon Come Early in 2025?

### 1. No Single Reason: A Complex Interplay

- There is **no "secret sauce"** or one definitive reason for early monsoon onset.
- Early onset is not a consistent predictor of good rainfall, but a delay beyond 2 weeks often results in **deficient monsoons**.

### 2. Atmospheric and Oceanic Factors

- **Low-pressure system** along India's west coast helped **pull the monsoon trough northward**.
- **Late-season cyclone activity** can advance the trough and accelerate onset.
- Influences include:
  - **Arctic warming** (affects jet streams)
  - **Wind shifts over the Arabian Sea**
  - **Pacific typhoons** (can draw moisture away and delay onset)

### 3. Sea Surface Temperature (SST) Anomalies

- **2024–25 SST anomalies** are unusual:
  - Warm SSTs in both **east and west Pacific**
  - **Cooler SSTs in central Pacific**
  - Described as a **"failed La Niña"**
- Indicates that **climate models** may have **limitations** in interpreting evolving ENSO patterns.

## Scientific Theories Behind Onset

### 1. The Monsoon Trough Mechanism

- Starts in the **northwestern tropical Pacific** and moves westward.
- Key driver of monsoon onset via the **Andaman Sea and Bay of Bengal**.

- Since the 1970s, delays and irregularities in this system point to a **climate regime shift**.

## 2. ENSO and IOD Influence

- ENSO (El Niño/La Niña) and IOD (Indian Ocean Dipole) are **major ocean-atmosphere phenomena**.
- **2025 likely to be a neutral ENSO and IOD year**, but decadal indicators hint at an evolving El Niño.
- Yet, there is **no strong correlation between ENSO/IOD and onset timing**.

## Climate Change and Natural Variability

- **Global warming** (current anomaly:  $>1.2^{\circ}\text{C}$  above pre-industrial) has:
  - Increased cyclone frequency/intensity
  - Altered Pacific SST patterns
  - Made **intra-seasonal rainfall distribution erratic**
- **Monsoon withdrawal patterns** are also shifting.
  - Some areas see a **merging of southwest and northeast monsoons**
- **Uncertain monsoon models** hinder predictability.

## Historical Comparison: 2025 vs. 2009

- **2009 onset** was also early (May 23), but it ended in a **monsoon drought**.
- 2009 had:
  - Mild El Niño
  - $0.5^{\circ}\text{C}$  global warming

- **2025:**
  - Higher warming ( $>1.2^{\circ}\text{C}$ )
  - SST anomalies, though not identical, show **similar Pacific irregularities**

- Thus, early onset **does not guarantee** a normal or excess monsoon.

## Conclusion:

- **Monsoon prediction** is crucial for India's **agriculture, water management, and economy**.
- **Onset alone is not sufficient** — effective planning depends on understanding **seasonal distribution, intensity, and withdrawal**.
- **Climate change and decadal variability** have made monsoon behavior more **erratic and difficult to forecast**.

## Egyptian Archaeologists Discover Three Tombs in Luxor

### Context:

- Egypt's Ministry of Tourism and Antiquities has announced the discovery of **three tombs** at the **Dra Abu al-Naga necropolis** in **Luxor**, part of the historic Theban Necropolis on the **West Bank of the Nile**.

### Relevance:

- **GS Paper I** : Art & Culture

### Details of the Discovery:

### Location:

- **Dra Abu al-Naga**, Luxor, Egypt
- Near **Deir al-Bahri** and the **Valley of the Kings**

- **Archaeological Importance:** Discovery of **funeral artifacts** and **statues** sheds light on administrative and religious functions of ancient Egypt

### Period:

- **New Kingdom (1550–1070 BCE)**
- Includes tombs from the **18th Dynasty** and the **Ramesside period**

### Related Recent Discoveries:

- **Jan 2025:** Rock-cut tombs near **Queen Hatshepsut's temple causeway** (Deir al-Bahri), dating back 3,600 years
- **Late 2024:** Middle Kingdom tomb with **11 sealed burials** at **South Asasif**, by Egyptian-American team

### Tombs and Their Occupants:

#### 1. Tomb of Amun-em-Ipet (*Ramesside Period*)

- **Role:** Functionary in the **Estate of Amun**
- **Features:** Small courtyard, square hall, banquet scenes, and funeral depictions
- **Significance:** Reflects religious service under the god Amun

#### 2. Tomb of Baki (*18th Dynasty*)

- **Role:** Supervisor of the **grain silo**
- **Features:** Multiple halls and chambers, burial well
- **Significance:** Indicates **bureaucratic sophistication** and storage systems

#### 3. Tomb of "S" (*18th Dynasty*)

- **Roles:** Supervisor at the Temple of Amun (Oasis), **Writer**, **Mayor of the northern oases**
- **Features:** Transverse and longitudinal halls, burial shaft
- **Significance:** Reflects **religious and administrative roles**

### Significance of the Discovery:

- **Cultural & Scientific Value:** Offers insight into **New Kingdom society**, particularly **elite officials**, their **roles**, and **funerary customs**

# GENERAL STUDIES - II

- 1. Constitution**
- 2. Polity**
- 3. Governance**
- 4. Social Justice**
- 5. International Relations**

## GS 2

### Cabinet Committee on Security (CCS)

#### Context:

- In response to the recent terror attack in Pahalgam, the Cabinet Committee on Security (CCS) has initiated key measures against Pakistan, focusing on national security and diplomatic strategy.

#### Key Highlights:

- The **Cabinet Committee on Security (CCS)** is chaired by the **Prime Minister**.
- Members include the Ministers of **Defence, Home Affairs, Finance, and External Affairs**.
- **Defence chiefs** and senior bureaucrats may be called for meetings as needed.
- The CCS is responsible for decisions on **internal security, defence policy, law and order, and strategic appointments**.
- It also addresses issues related to **border security and foreign policy** with national security implications.
- The **Cabinet Committees**, including CCS, are created by the Prime Minister.
- **Currently, there are 8 Cabinet Committees**, covering areas like Economic Affairs, Political Affairs, and Parliamentary Affairs.

### FSSAI notified stricter rules for antibiotics in food items

#### Context:

- Recently, the Food Safety and Standards Authority of India (FSSAI) notified stricter rules for antibiotics in food items specifically in the production of meat and dairy products, effective from April 1, 2025.
  - This move aligns with India's commitment to the **Muscat Ministerial Manifesto** on AMR (2022).

#### Relevance:

**GS-02 (Government policies and interventions)**

#### About the Issue:

- The ban is part of India's compliance with global efforts under the WHO Global Action Plan on AMR and the Third Global High-Level Ministerial Conference on AMR aimed at boosting political action and funding to control AMR.

#### What is AMR and Why It's a Concern:

- Antimicrobial resistance is the resistance acquired by any microorganism (bacteria, viruses, fungi, parasites, etc.) against antimicrobial drugs (such as antibiotics, antifungals, antivirals, antimalarials, and anthelmintics) that are used to treat infections.

- It develops when microbes become resistant to the effects of medicines, which ultimately makes infections harder to treat.
  - However, it is a natural phenomenon for bacteria to evolve, making drugs used to treat infections less effective.
- Causes: Overuse/misuse of antibiotics in humans, animals, and agriculture.
- Microorganisms that develop antimicrobial resistance are also referred to as “superbugs”.
- The World Health Organization (WHO) has identified AMR as one of the top ten threats to global health.
- Health Threat: In 2019, nearly 5 million deaths were linked to drug-resistant infections.
- Economic Cost: World Bank warns of US\$ 1 trillion in added healthcare expenses by 2050.

### About the Muscat Ministerial Manifesto:

- The Muscat Ministerial Manifesto aims to
  - Reduce the total amount of antimicrobials used in agrifood systems by at least **30 percent to 50 percent by 2030**.
  - End the use of medically important antimicrobials for growth promotion in animals.
  - Ensure the Appropriate Antibiotic Access group antibiotics represent at least 60% of human antibiotic consumption by 2030.

### Way Forward:

- Biosecurity measures on farms

- Promotion of organic and low-antibiotic farming
- Vaccination, probiotics, and a One Health approach integrating human, animal, and environmental health.

## Aqua Insurance

### Context:

- The **Union Minister of Fisheries, Animal Husbandry & Dairying** awarded the **first-ever Aqua Insurance** to beneficiaries under the **Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY)**. Also launched: **VyAS-NAV** mobile app for the **5th Marine Fisheries Census**.

### Relevance:

- GS-02 (Government policies and interventions)

### About PM-MKSSY & Aqua Insurance:

- **Sub-scheme of:** Pradhan Mantri Matsya Sampada Yojana (PMMSY).
- **Aim:** Strengthen the financial security of aquafarmers through **insurance for aquaculture losses**.
- **Eligibility:**
  - Individual fish farmers
  - Firms, cooperatives, companies
  - FFPOs (Fish Farmer Producer Organisations)
- **Premium Coverage:**
  - Maximum insured amount: ₹1 lakh per farmer
  - Coverage volume: Up to **1800 m<sup>3</sup> water area**

- **Social Inclusion:**
  - Additional 10% premium incentive for **SC/ST/women beneficiaries**
- **Duration:** Covers one crop cycle

### About VyAS-NAV App:

- Developed for **digital data collection** under the **5th Marine Fisheries Census**.
- Promotes real-time data gathering on **fisheries and allied sectors**.

## Bio-input Resource Centres (BRCs)

### Context:

- Recently, while announcing the Union Budget 2023-24, the government had proposed to set up **10,000 Bio-Input Resource Centres (BRCs)** to promote Natural Farming (NF) across India.

### Relevance:

- **GS-02 (Government policies and interventions)**

### About BRCs:

- BRCs are **cluster-level enterprises** that provide biological and organic farming inputs to farmers within a defined local area.
- They are a part of the **National Mission on Natural Farming (NMNF)** that promotes chemical-free and sustainable agriculture.
- Functions of BRCs:
  - Maintain and sell bio-fertiliser and bio-pesticide cultures.
  - Prepare and sell ready-to-use organic inputs.

- Provide training to farmers on botanical and animal-based inputs.
- Disseminate knowledge on natural farming.
- Sell traps, lures, and other pest control tools.

### Key Features of Guidelines:

- **Financial Support:** ₹1 lakh per BRC (excluding infrastructure costs).
- **Convergence:** With schemes like
  - 10,000 FPO scheme
  - National Mission on Edible Oilseeds, etc.
    - **Bio-Input Customization:** As per local land use, soil type, and crop systems.
    - **Entrepreneur Criteria:** Must be a practicing natural farmer or have relevant NF experience.

### Significance:

- The initiation will prove effective in addressing issues like training and market access and aids easy transition to natural farming.
- Helps farmers get easy access to organic inputs.
- This move shall inculcate sustainable practice in the farming techniques.

### Also know:

#### National Mission on Natural Farming (NMNF):

- It was launched in **November 2024** under the **Ministry of Agriculture & Farmers' Welfare**.
- The aim of the scheme is to promote chemical-free farming.
- It is a **Centrally Sponsored Scheme**.

- Financial Outlay: A total allocation of ₹2,481 crore has been approved up to FY 2025-26.
- **Objectives:**
  - Minimize input costs by reducing chemical usage.
  - Inculcate eco-friendly practices and organic methods.
  - Restore soil health, promote biodiversity, and improve climate resilience.
- **Operational Framework**
  - Form 15,000 clusters across various Gram Panchayats.
  - Train 1 crore farmers and promote natural farming over 7.5 lakh hectares.
  - Set up 10,000 Bio-Resource Centres (BRCs) to ensure access to bio-inputs.
  - Engage 30,000 Krishi Sakhis for farmer mobilization and support.

Posts, which allows the sender to post certain books and study material through the post office.

- Objective: To bridge the educational divide and help students access an affordable route of postal delivery of educational content.
- Scope:
  - Only non-commercial, educational material is allowed.
  - Business/commercial publications or materials with advertisements are excluded.
  - Real-time tracking is available for all consignments.
  - Each book must bear printer/publisher details as per regulations.
- Pricing (Concessional Rates):
- Packages up to 300 grams cost ₹20, and to 5 kg costs ₹100.

## Indian Institute of Creative Technology (IICT)

### Gyan Post

#### Context:

- Recently, a new service was launched by India Post called 'Gyan Post.' It enables affordable delivery of books and study materials across the country.

#### Relevance:

- **GS-02 (Government policies and interventions)**

#### About Gyan Post:

- Gyan Post is a product under the mail services offered by the Department of

#### Context:

- Recently, the Indian Institute of Creative Technology (IICT) was launched in line with the present IITs and IIMs to revolutionise the Animation, Visual Effects, Gaming, Comics and Extended Reality (AVGC-XR) sector.

#### Relevance:

- **GS-02 (Government policies and interventions)**

#### About IICT

- The IICT will become a **National Centre of Excellence (NCoE)** for Animation, Visual Effects, Gaming,

Comics, and Extended Reality (AVGC-XR).

- **Aim:** To follow the model of IITs and IIMs to become a world class training hub.
- IICT will offer **high-end professional training** to meet growing demand in AVGC-XR sector.

### What is XR (Extended Reality)?

- A collective term for immersive technologies that blend the digital and physical world:
  - Virtual Reality (VR) – fully immersive digital environments.
  - Augmented Reality (AR) – overlays digital info on real-world view.
  - Mixed Reality (MR) – interaction between real and virtual objects in real time.

### Status of AVGC-XR Sector

- Global market: Valued at **\$366 billion** (2021).
- India's share: **Less than 1%**, but projected to reach \$26 billion by 2030.
- **Karnataka** is emerging as a leader in this sector.

### Key Growth Drivers in India

- Rising OTT user base: Over 547 million users in 2024.
- Smartphone & Internet boom: 900 million internet users expected by 2025, majorly from rural areas.
- Wider applications: Use in EdTech, architecture, gaming, and design.
- Emerging technologies: Investment in AR/VR, growth of 5G, and rising R&D in immersive content.

## India Extends \$200 Million Defence Credit Line to Angola

### Context:

- Recently, India extended a **\$200 million Line of Credit (LoC)** to Angola to enhance bilateral defence cooperation and support Angola's defence procurement and capacity building.

### Relevance:

- GS-02 (Government policies and interventions)

### About Angola

- It is the **second-largest Portuguese-speaking (Lusophone) country** in both total area and population.
- It is the **seventh-largest** country in Africa.
- It is situated in southwestern Africa.
- **Bordering Nations:**
  - North: Republic of the Congo
  - Northeast: Democratic Republic of the Congo
  - Southeast: Zambia
  - South: Namibia
  - West (Maritime Boundary): Atlantic Ocean

### Geographical and Natural Features

- Major Rivers: Zambezi, Cuango (Kwango), Cuanza (Kwanza)
  - The Cuango River forms a boundary with the Democratic Republic of the Congo.

- Natural Resources: Rich in petroleum, diamonds, iron ore, copper, phosphates, feldspar, gold, bauxite, and uranium.
- Climate: Predominantly tropical with a distinct dry season.
  - Heavily influenced by the cold Benguela Current, which flows northward along Angola's western coastline.

### Significance of the Credit Line

- Boosts India–Africa defence partnership under India's SAGAR (Security and Growth for All in the Region) vision.
- Supports Angola in modernising its defence infrastructure while deepening strategic engagement with India.
- Highlights India's growing role in capacity building and development financing in Africa.

## Supreme Court Ruling: Scope to Modify Arbitral Awards under Section 34 & 37

### Context:

- In the case of *Gayatri Balasamy v. ISG Novasoft Technologies Ltd*, the Supreme Court clarified the legal scope for modifying arbitral awards under the Arbitration and Conciliation Act, 1996.

### Relevance:

- **GS-02 (Indian Polity)**

### Key Takeaways from the Judgment

- **Partial Modification Permitted:** Courts can modify or set aside parts of an arbitral award if the award is severable—i.e., invalid sections can be separated from valid ones.
- **Doctrine Cited:** The SC invoked the principle of “omne majus continet in se minus” (the greater includes the lesser), implying that the power to fully set aside an award includes the power to partially do so.
- **Error Correction Allowed:** Courts can rectify clerical, typographical, or computational errors in the arbitral award.
- **Post-Award Interest Modification:** The Court may also revise post-award interest under certain circumstances.
- **Article 142 Invoked:** The SC noted that such powers may also be exercised under Article 142 of the Constitution (complete justice), as long as it aligns with the basic structure and principles of the 1996 Act.

### Background: Arbitration in India

- **Definition:** Arbitration is a method of Alternative Dispute Resolution (ADR) where parties mutually agree to settle disputes outside court through a neutral third party.
- **Advantages:** It is less adversarial, faster, and more flexible than traditional litigation.
- **Legal Framework:**
  - Governed by the Arbitration and Conciliation Act, 1996.

- Based on the UNCITRAL Model Law, 1985 for international commercial arbitration.
- Section 34: Allows for setting aside an arbitral award by court.
- Section 37: Lists situations where appeals can be made against arbitral orders.

## Nipah Resurfaces in Kerala District

### Context

- A 42-year-old woman in Malappuram district, Kerala, has tested positive for Nipah virus (NiV), prompting health authorities to initiate emergency surveillance and containment measures.

### Relevance: GS2(Health) Nipah Virus (NiV) – Key Facts

- **Family:** Paramyxoviridae
- **Genus:** Henipavirus
- **Type:** Zoonotic RNA virus
- **Reservoir Host:** Fruit bats (Pteropus species), also known as **flying foxes**

### Transmission:

- **Animal to human:** Direct contact with infected bats, pigs, or consumption of fruits contaminated by bat saliva or urine.
- **Human to human:** Close contact with bodily fluids of infected individuals (e.g., during caregiving).
- **Nosocomial transmission** (hospital-acquired) has also been recorded.

### Symptoms:

- **Incubation period:** 4 to 14 days (can extend up to 45 days in some cases).
- **Initial signs:** Fever, headache, drowsiness, nausea, sore throat.
- **Severe progression:** Encephalitis, disorientation, coma, seizures.
- **Case Fatality Rate (CFR): 40% to 75%** (extremely high compared to many viruses)

### Geographical Spread:

- First outbreak: **Malaysia and Singapore in 1998-99**, primarily from infected pigs.
- **India:** Outbreaks in **West Bengal (2001, 2007)** and **Kerala (2018, 2019, 2021, 2023, 2025)**.
- Also reported in **Bangladesh** (frequent outbreaks since 2001).

### Prevention & Treatment:

- **No specific antiviral treatment or vaccine**
- **Management:** Supportive care, ICU monitoring for neurological symptoms.
- **Preventive Measures:**
  - Avoid consumption of half-eaten fruits.
  - Avoid contact with bats and pigs.
  - Strengthen surveillance and contact tracing.

### Research & Development:

- **Monoclonal antibodies** (e.g., m102.4) under trial stages.
- WHO identified NiV as a **priority disease** in its **R&D Blueprint**.
- India is collaborating with **ICMR, CEPI**, and global health bodies for vaccine development.

### Disaster & Health Risk Potential:

- Classified as a **Biosafety Level-4 (BSL-4) pathogen**.
- Listed among WHO's **top 10 priority pathogens**.
- High potential for **localised epidemics** and **global health security threats**.

- High fever, **Severe joint pain**, Rash, Muscle pain, Headache, Fatigue
- Joint pain can **persist for weeks or months**, especially in older individuals.

## Europe reviews Valneva's chikungunya vaccine

### Context:

- The European Medicines Agency (EMA) has temporarily suspended the use of Valneva's chikungunya vaccine (Ixchiq) in adults aged 65 and above due to reports of serious adverse events, including two deaths.

### Relevance : GS2(Health) Chikungunya

- **Pathogen:** Chikungunya virus (CHIKV)
- **Family:** *Togaviridae*
- **Genus:** *Alphavirus*
- **Type:** RNA virus
- **First Identified:** 1952, in Tanzania

### Transmission:

- **Primary vectors:** *Aedes aegypti* and *Aedes albopictus* mosquitoes (also vectors for Dengue, Zika).
- **Mode of spread:** Mosquito bite (not human-to-human directly).
- Most transmission occurs **during the daytime** (mosquitoes are diurnal).

### Symptoms:

- Incubation: **2 to 7 days**
- **Key symptoms:**

### Treatment & Prevention:

- **No specific antiviral treatment.**
- Supportive care: Rest, fluids, analgesics

### Global Impact:

- **Endemic in:** Africa, Asia, Indian subcontinent, Caribbean, Americas.
- India has had **frequent outbreaks** since 2006.
- Recent outbreaks in **Italy (2007, 2017)**, **France (2010)**, and Latin America.

### Vaccines:

- No widely deployed vaccine **until recently**.
- **Valneva's Ixchiq:**
  - First approved vaccine (by US FDA in 2023)
  - **Live-attenuated** formulation
  - EMA currently reviewing safety due to **adverse events in elderly**
- Other vaccines under trial: VLA1553, Bharat Biotech candidates.

**If Rohingya are foreign, Central govt. can deport them, says SC**

### Context:

- The Supreme Court observed that if Rohingya are found to be "foreigners"

under the Foreigners Act, the Central Government has the right to deport them, as per due legal procedure.

### Relevance :

- **GS 2 ( Polity & Governance ) | GS 3 ( Internal Security )**

### Key Legal Highlights:

- **Bench:** Headed by **Justice Surya Kant**
- **Issue:** Petitions filed challenging Centre's move to deport **Rohingya refugees**
- **Petitioners' Argument:**
  - Rohingyas hold **UNHCR refugee cards**
  - They enjoy **protection from deportation** under international humanitarian principles (non-refoulement)

### Centre's Stand:

- India is **not a signatory** to the **1951 UN Refugee Convention**
- Referred to an earlier SC ruling allowing the **Centre to regulate entry, stay, and deportation of foreigners** under **Section 3 of the Foreigners Act, 1946**
- **Refugee status granted by UNHCR is not binding** on Indian law

### Supreme Court Observations:

- **Right to Life (Article 21)** and **Right to Equality (Article 14)** are available to all
- However, **Right to settle or reside (Article 19(1)(e))** is **exclusive to Indian citizens**
- Refugees have **no absolute right** to reside in India if found to be illegal immigrants

- Deportation must follow "**procedure established by law**"

### Implications for India:

- Raises **questions on refugee protection** in absence of a **domestic refugee law**
- Highlights **security vs. humanitarian rights** debate
- Puts spotlight on **India's policy on stateless persons** and **informal refugee protocols**

### Way Forward:

- Enact a **comprehensive refugee policy/law**
- Clarify India's stance on **non-refoulement**
- Ensure deportations are **humane, lawful, and transparent**
- Balance **national security concerns** with **international human rights standards**

### Who are the Rohingya?

- The Rohingya are a Muslim ethnic minority group who primarily reside in Rakhine (formerly Arakan) and speak a dialect closely related to the Chittagonian language spoken in Bangladesh, which is distinct from the dominant Burmese language. While the Rohingya claim ancestry in the region dating back centuries, the Myanmar government has consistently denied them recognition as one of the country's official ethnic groups, instead labeling them as illegal immigrants from Bangladesh

## History of the Rohingya Crisis

### Pre-1948 (British Colonial Rule):

- British annexation of Arakan in 1826 led to migration from Bengal to Rakhine.
- Migration increased under British rule for labour.

### 1948 – Myanmar Independence:

- Rohingya not recognized as one of the official 135 ethnic groups.
- Tensions rise between Buddhist majority and Muslim Rohingya.

### 1962 – Military Rule:

- Ethnic repression increases under military dictatorship.
- Rohingya citizenship increasingly restricted.

### 1982 – Citizenship Law:

- Myanmar enacts a Citizenship Law excluding Rohingya from full citizenship.
- They are labeled as "stateless"; denied access to basic rights like education, healthcare, and movement.

### 2012 – Communal Violence:

- Riots erupt in Rakhine between Rohingya Muslims and Rakhine Buddhists.
- Thousands displaced; refugee outflows begin toward Bangladesh, India, Malaysia.

### 2016–2017 – Military Crackdown:

- Armed group Arakan Rohingya Salvation Army (ARSA) attacks Myanmar police posts.
- In response, Myanmar military launches brutal counterinsurgency operation.
- UN calls it a "textbook case of ethnic cleansing"; over 740,000 Rohingya flee to Bangladesh.

## South Asia Press Freedom Report 2024–25

### Context

- The 23rd Annual **South Asia Press Freedom Report 2024–25**, titled "*Frontline Democracy: Media and Political Churn*", has flagged a concerning decline in press freedom across South Asia, including India. The findings underline the increasing challenges to journalism posed by legal restrictions, violence, disinformation, and political interference.

### About the Report

- **Released By:** Asia Press Freedom Group
- **Coverage:** 8 South Asian countries – India, Pakistan, Afghanistan, Sri Lanka, Bangladesh, Nepal, Bhutan, and Maldives
- **Timeframe:** 2024–25 Annual Report

### Key Findings

- **Over 250 media rights violations** recorded across the region.
- **69 journalists jailed or detained, and 20 killed** while on duty.

- **India ranked 151st** globally in press freedom (Reporters Without Borders Index).
- **Bhutan dropped to 152nd**, its lowest-ever ranking.
- **Pakistan witnessed its most violent year** for journalists in the past two decades.
- Major threats identified:
  - Legal repression
  - Disinformation and IT Cell propaganda
  - AI-driven content distortion
  - State surveillance and censorship

## Issues Undermining Press Freedom

- 1. Legal and Institutional Pressure**
  - Misuse of laws like **UAPA, PMLA, Sedition, and Defamation** to suppress critical journalism.
  - **IT and ED raids** on independent media houses further stifle dissent.
- 2. Disinformation Ecosystem**
  - Political **“IT Cells”** spread hate speech and fake narratives.
  - **Global Risks Report 2024** labels “manipulated information” as the **biggest short-term global threat**.
- 3. Choking Independent Media**
  - Denial of **government advertisements**.
  - Selective **internet shutdowns** and restrictions on digital news platforms.
- 4. AI and Platform Economy Risks**
  - Rise of **AI-generated fake content** diluting journalistic standards.

- **Gig journalists** face poor working conditions, no labour protection, and rising job insecurity.

## 5. Gender Disparities

- **Under-representation of women** in media leadership roles.
- Persistent **gender-based harassment** both online and offline.

## Consequences of Declining Press Freedom

- **Self-Censorship** due to fear of legal retaliation or violence.
- **Democratic Deficit** with weakened checks on government functioning.
- **Erosion of Public Trust** in mainstream media due to perceived bias.
- **Curtailment of Citizen Access to Information**, especially post laws like **DPDP Act 2023** and amendments to **RTI Act**.

## Way Forward

- 1. Reform Media Laws**
  - Enact the **Media Transparency Bill 2024** to check advertising monopolies and political influence.
- 2. Establish Independent Oversight**
  - Create a **media ombudsman** for addressing censorship complaints and ensuring editorial independence.
- 3. Protect Journalists’ Rights**
  - Extend **labour protections** to freelancers and gig journalists.
  - Provide **legal aid**, insurance, and safety protocols.

#### 4. Strengthen Fact-Checking

- Invest in **independent fact-checking organisations**, particularly during elections and conflict reporting.

#### 5. Promote Digital Pluralism

- Support **community-driven and regional media outlets** to counterbalance centralised narratives.

### Conclusion

- The steady decline in press freedom across South Asia, including India, threatens not just journalism but the **democratic fabric** itself. A **free, independent, and fearless press** is essential to ensure **transparency, accountability, and informed citizenry**. Proactive legal and institutional reforms must be undertaken to restore public trust and protect the integrity of the Fourth Estate.

## Caste Census in India: A Bold Step Towards Social Justice and Data-Driven Governance

### Context and Relevance

- In a landmark move, the Narendra Modi government has announced the inclusion of caste enumeration in the upcoming Census — a long-overdue step that could redefine the landscape of social justice policymaking in India. This decision is not just a political or administrative reform; it has far-

reaching implications for governance, equity, and constitutional mandates. For aspirants of the **UPSC Civil Services Examination**, understanding the historical, legal, social, and administrative dimensions of the caste census is essential, especially for topics in **GS Paper II (Governance, Constitution, Polity)** and **GS Paper I (Indian Society)**.

### Historical Background: From Colonial Counting to Post-Independence Silence

- The **last full caste enumeration** in India was conducted in **1931** during British rule, which documented around 4,147 castes.
- **Post-Independence**, the Government of India continued enumerating only **Scheduled Castes (SCs)** and **Scheduled Tribes (STs)** in every Census starting from 1951.
- The **Other Backward Classes (OBCs)**, despite being constitutionally eligible for reservations, were **excluded** from the Census process, leading to policy planning in an **evidence vacuum**.
- **Dr. B.R. Ambedkar**, in his 1955 essay "*Thoughts on Linguistic States*", sharply criticized the omission of caste data in the 1951 Census as "petty intelligence" — underlining the need for **visibility in data** as a prerequisite for social justice.

### Why Caste Census Matters Today

#### 1. Legal and Constitutional Imperative

- The Indian Constitution, while speaking of "social and educational backwardness", uses the term "**classes**" but, through judicial

interpretation (e.g., *Indra Sawhney vs. Union of India*, 1992), **caste has been accepted as a valid proxy** for determining backwardness.

- **Reservations in education, public employment, and now local governance (via the 73rd and 74th Constitutional Amendments)** for OBCs require **granular, disaggregated caste data**.
- The **10% EWS quota for upper castes** (2019) has further increased the need for an **inclusive enumeration** of all social groups.

## 2. Administrative Necessity

- The Justice G. Rohini Commission (for sub-categorisation of OBCs) found that **elite capture** was rampant:
  - Just **10 OBC castes took 25%** of all benefits.
  - Around **75% of OBCs cornered 97%** of the benefits.
  - **38% of OBCs got only 3%**, while **another 37% got nothing**.
- Without data, creamy layer norms, benefit tracking, and rational sub-categorisation are impossible.

## 3. Political and Social Relevance

- Caste movements by communities like the **Marathas, Patidars, Jats, and Gujjars** demanding reservations have often been handled arbitrarily due to lack of hard data.
- A caste census will allow governments to **evaluate such claims transparently and empirically**.

## Lessons from Past Experiences

### The SECC-2011 Debacle

- Though Parliament resolved in 2010 to count caste in 2011, the **Socio-Economic and Caste Census (SECC)** failed due to:
  - No backing under the **Census Act, 1948**.
  - Conducted by ministries (Rural & Urban Development) lacking domain expertise.
  - Confusing, open-ended caste questions led to the recording of **46 lakh caste entries**, including gotras, surnames, clan names — making the data unusable.

### The Bihar Success Model (2023)

- Used a **vettted list of 214 castes**, with a 215th option for "Others".
- Planned, trained, and digitally executed — demonstrating that **accurate caste enumeration is not only feasible but replicable** across India.

### Blueprint for a Credible and Effective Caste Census

- To avoid repeating past mistakes, a successful caste enumeration must include:
  1. **Legal Mandate:** Amend the **Census Act, 1948** to explicitly include caste.
  2. **Institutional Clarity:** Entrust the task only to the **Office of the Registrar General and Census Commissioner**.
  3. **Standardised Questionnaire:** Pre-coded drop-down options for caste, sub-caste, aliases, surnames.
  4. **State-Specific Lists:** Co-created with inputs from local communities,

- sociologists, and state governments.
5. **Enumerator Training:** On regional variations and terminology.
  6. **Use of Digital Tools:** Mobile-based data collection with in-built error checks.
  7. **Representative Staffing:** Deploy enumerators from **diverse communities** to minimise bias.
  8. **Oversight and Auditing:** District-level supervisory committees for real-time monitoring.
  9. **Pilot Surveys:** Test in diverse states before national implementation.

### Conclusion:

#### A Data-Driven Future for Social Justice

- The caste census is not about promoting identity politics — it is about **acknowledging lived realities**. By counting caste, India is taking a vital step toward **evidence-based governance**. The absence of data has allowed **entrenched caste elites** to monopolise resources while marginalised groups remain invisible.
- The decision to include caste enumeration in the upcoming Census is **bold, transformative, and constitutionally essential**. It presents a unique opportunity to correct decades of omission and finally put in place a **scientific, inclusive, and just reservation and development policy**.
- As UPSC aspirants and future policymakers, understanding and engaging with such reforms is not just academic — it is foundational to shaping a better India.

## Mizoram Declared India's First Fully Literate State

### Context

- Mizoram has officially been declared **fully literate**, setting a new benchmark in India's educational journey. With a **literacy rate of 98.2%** (PLFS 2023–24), the state has surpassed the national benchmark and become a model for others to follow.

### What is 'Full Literacy'?

- Under the **ULLAS (Understanding Lifelong Learning for All in Society)** initiative, a region is considered **fully literate** when **more than 95% of its population is literate**.
  - **Mizoram's 2023–24 Literacy Rate:** 98.2%
  - **2011 Census Literacy Rate:** 91.33%
  - **Key Program Implemented:** *Nav Bharat Saaksharta Karyakram* under the ULLAS framework

### About the ULLAS Scheme

- **Full Form:** Understanding Lifelong Learning for All in Society
- **Type:** Centrally Sponsored Scheme
- **Launched:** Financial Year 2022–23
- **Duration:** FY 2022–2027 (5 years)
- **Nodal Ministry:** **Ministry of Education**, Department of School Education & Literacy
- **Primary Focus:** Adult education and lifelong learning, especially for individuals aged 15 and above who missed out on formal schooling

- **Funding Pattern:**
  - **General States:** 60:40 (Centre:State)
  - **North-Eastern States & Himalayan UTs:** 90:10
  - **Union Territories** (without legislature): 100% central funding

### Aims and Objectives

- Provide inclusive adult education in line with the **National Education Policy (NEP) 2020**
- Reach **non-literate individuals aged 15 and above**
- Improve **functional literacy, digital proficiency, and vocational competence**

### Core Areas of the ULLAS Scheme

1. **Foundational Literacy & Numeracy (FLN)**
  - Basic skills in reading, writing, and arithmetic for adult learners
2. **Critical Life Skills**
  - Includes awareness in areas like health, hygiene, disaster response, and financial literacy
3. **Basic Education**
  - Equivalent to formal primary to secondary school education
4. **Vocational Training**
  - Imparts job-relevant skills to enhance employability
5. **Continuing Education**
  - Promotes lifelong learning through educational, cultural, and recreational programs

### How It Was Implemented

- **Community-Led Approach:** Trained volunteers served as grassroots educators

- **Digital Learning Tools:** Content delivered through mobile apps, online platforms, TV, and radio
- **Massive Outreach:**
  - Over **2.37 crore adult learners** enrolled
  - Supported by **40.84 lakh volunteer instructors** (as of 2025)
- **Evaluation System:** Learners assessed via the **Foundational Literacy and Numeracy Assessment Test (FLNAT)**

### Why Mizoram's Feat Matters

- Mizoram's accomplishment is not just a regional victory—it reflects the transformative power of **community engagement, inclusive education policies, and digital outreach**. It offers a replicable blueprint for achieving **universal literacy across India**.

## Bridging the Medical Oxygen Access Gap in South-East Asia: A Public Health and Governance Imperative

### Context

- Medical oxygen is an essential component of modern healthcare, critical for treating conditions like pneumonia, neonatal disorders, trauma, and COVID-19. Yet, despite its importance, access to safe, affordable, and reliable medical oxygen remains severely limited, especially in **South Asia and East Asia-Pacific regions**, which face **service coverage gaps of**

78% and 74% respectively. The COVID-19 pandemic further highlighted these deficiencies, exposing systemic weaknesses in oxygen infrastructure across low- and middle-income countries (LMICs), including India.

## Relevance

- **GS Paper II: Governance, Health Sector Reforms**
  - Role of the government and WHO in public health infrastructure.
  - International collaboration and capacity building in healthcare delivery.
- **GS Paper III: Science & Tech, Disaster Management**
  - Role of innovation (solar-powered oxygen systems, PSA plants).
  - Managing public health emergencies through resilient infrastructure.
- **Essay Paper / Ethics**
  - Ethical dimensions of equitable healthcare.
  - Human rights and dignity in access to essential medicines.

## Multi-Dimensional Analysis of the Oxygen Access Gap

### 1. Health Infrastructure Challenges in Medical Oxygen Access

- **Limited Equipment Penetration:** Only **54% of LMIC hospitals have pulse oximeters** and **58% have access to medical oxygen**. This leads to delayed diagnosis, inadequate treatment, and preventable deaths.

- **High Financial Cost:** An estimated **\$6.8 billion** is required globally to bridge the oxygen gap; **South Asia alone needs \$2.6 billion**.
- **Shortage of Skilled Workforce:** Lack of trained biomedical engineers and technicians hampers the maintenance and operation of oxygen equipment.

### 2. Policy and Governance Bottlenecks

- **Short-term Emergency Responses:** COVID-19 induced a reactive, rather than sustainable, approach.
- **Lack of Long-Term Planning:** Many countries lack integrated scale-up plans for oxygen access within **Universal Health Coverage (UHC)**.
- **Weak Regulatory Frameworks:** There is a need for standardised safety protocols for storage, production, and delivery.

### 3. Regional Cooperation and WHO Interventions

- **WHO's Role:** Developed a **2022 report** highlighting best practices and initiated **regional collaboration** (e.g., Nepal training Bhutanese engineers).
- **Oxygen Resolution:** WHO's global call for periodic progress reviews (2026, 2028, 2030).
- **Scorecard and Monitoring Tools:** WHO Access to Medical Oxygen Scorecard promotes data-driven accountability.

#### 4. Innovations and Technological Solutions

- **PSA Oxygen Plants:** Pressure Swing Adsorption (PSA) plants offer decentralized oxygen production.
- **Solar-Powered Oxygen Systems:** Adopted in **Ethiopia and Nigeria**, these ensure uninterrupted oxygen supply in low-power zones—ideal for **South-East Asia**.
- **Booster Pumps & Portable Concentrators:** Improve last-mile oxygen delivery.

#### 5. Private Sector and Civil Society Involvement

- **Private Investment:** Encouraged in **local manufacturing** to cut import costs and address supply-demand gaps.
- **NGOs and Donors:** Must shift from crisis-mode aid to long-term operational support and infrastructure funding.
- **Academia and Research:** Need to develop **affordable, scalable, low-maintenance** oxygen technologies tailored to LMICs.

#### 6. Strategic Policy Actions Needed

- **Integrated Oxygen Ecosystems:** National governments must draft and execute oxygen scale-up strategies.
- **Training and Capacity Building:** Continuous training for biomedical personnel and plant operators is crucial.
- **Decentralised Manufacturing:** Reduces transport cost and improves rural reach.
- **Emergency Preparedness Integration:** Oxygen access should

be a **core part of disaster and health emergency planning.**

#### Conclusion

- The oxygen access crisis is not just a public health issue—it is a **matter of equity, justice, and human rights**. Oxygen, a life-saving medicine with no alternative, should never be a luxury. The pandemic has provided both a warning and a window of opportunity. If we fail to act now, history may repeat itself.
- A **multi-stakeholder, coordinated, and sustained effort**—involving **governments, WHO, private players, civil society, and academia**—is the only way to ensure equitable oxygen access. South-East Asia, with its high demand and demonstrated capacity for regional collaboration, must lead the way in bridging this gap.

### Bengaluru Floods Again: A Crisis of Urban Planning and Governance

#### Context

- Bengaluru, India's IT capital, experienced yet another spell of devastating urban floods in May 2025 due to intense pre-monsoon rains. The flooding submerged residential layouts, arterial roads, and commercial zones, prompting the deployment of rescue boats and tractors. The event is not isolated; Bengaluru has seen similar urban flooding episodes in 2015, 2017, 2020, and 2022. The consistent recurrence raises questions about the

city's planning, drainage infrastructure, and disaster preparedness.

## Relevance to UPSC CSE

This issue intersects multiple key areas of the UPSC Civil Services Examination syllabus:

- **GS Paper II – Governance:** Role of civic bodies, accountability, disaster response.
- **GS Paper III – Environment and Disaster Management:** Urban flooding, ecological mismanagement.

## Urban Flooding in Bengaluru: A Symptom of Deeper Urban Failures

### 1. The Seasonal Disconnect

- Despite pre-monsoon rainfall being a predictable pattern—with IMD data showing Bengaluru receives more rainfall in May (128.7 mm) than in June or July—the civic administration continues to delay its monsoon preparedness. Crucial storm-water drain (SWD) maintenance begins only in April, leaving the city exposed to early storms.

### 2. Repeating Mistakes: Flooding in the Same Localities

- Areas like **Sri Sai Layout**, **S.T. Bed Layout**, and **Trinity Fortune Layout** flood repeatedly, even with moderate rainfall. The root causes include:
  - Construction on lake beds or low-lying areas.
  - Choked and poorly maintained SWDs.

- Failure to execute promised engineering interventions like drainage vents.

This reflects systemic urban planning flaws and a lack of administrative accountability.

### 3. Governance and Infrastructure Gaps

- Despite the BBMP identifying 209 flood-prone spots and the Bengaluru Traffic Police flagging 137 inundation-prone road stretches, little has changed. Major traffic junctions like **Silk Board**, **Panathur underpass**, and **Hebbal flyover** continue to flood.

### 4. Ecological Neglect and Uncoordinated Agencies

- Lakes, once natural buffers for floods, are now full of treated water and silt, reducing their flood-carrying capacity. Moreover:
  - SWDs are often concretised, limiting groundwater recharge.
  - Trees—often improperly pruned or neglected—fall during high winds, damaging property and power infrastructure.

### 5. Need for a Paradigm Shift

- The city needs to **invert its planning timeline**:
  - Begin desilting and infrastructure repair in **February–March**, not April.
  - Deploy GIS-based flood-mapping and predictive modeling.
  - Adopt **Nature-Based Solutions** (NBS): urban

wetlands, recharge pits, and green infrastructure.

## Conclusion

- Bengaluru's floods are not just natural disasters—they are **human-made failures** of planning, preparedness, and ecological management. The repeated inundation of the same neighborhoods, the unfulfilled promises by authorities, and the visible disconnect between rainfall data and administrative action underline a deeper governance crisis.
- Civil servants and policymakers must push for **data-driven urban planning, inter-agency coordination, and community-based disaster resilience**. For India's urban future to be sustainable, Bengaluru must lead the way in turning crises into reform opportunities.

## India-Germany Strategic Partnership: Celebrating 25 Years

### Introduction

- India and Germany commemorate 25 years of a **strategic partnership** marked by shared democratic values, multilateralism, and sustainable development. The relationship has matured into a **multi-sectoral collaboration**, encompassing defence, economic integration, green development, and cultural exchange.

**Relevance: GS Paper 2**

## A Shared Vision: Strategic and Political Convergence

- **Strategic Partnership (1998–2023):** Rooted in a rules-based global order and shared commitment to peace and prosperity.
- **Unique Bilateral Framework – Intergovernmental Consultations (IGC):**
  - Launched in 2011; occurs every two years at the highest political level.
  - Enables whole-of-government dialogue across sectors: politics, tech, climate, economy.
- **Defence Cooperation:**
  - Joint exercises: *Tarang Shakti 2024*, naval port calls, capacity building.
  - Enhances Germany's presence in Indo-Pacific; supports India's maritime security.
- **Geopolitical Outlook:**
  - Germany's Indo-Pacific strategy and coalition government's "Focus on India" indicate enduring strategic convergence.

## Prosperity and Economic Integration

- **Investment & Trade:**
  - 2,000+ German companies in India; ~750,000 jobs created.
  - Indian companies embedded in Germany's high-tech sectors (automotive, pharma, IT).
- **Infrastructure Collaboration:**
  - Delhi-Meerut Rapid Rail operated by Deutsche Bahn—model for urban mobility.

- **India–EU Free Trade Agreement (FTA):**

- Germany backs India-EU FTA negotiations—crucial for diversifying trade and reducing dependency on China.

- **Technology & Innovation:**

- Active Indo-German collaboration in AI, robotics, quantum computing, and R&D.

### People-to-People Ties: The Soft Power Bridge

- **Education:**

- Over **50,000 Indian students** in Germany—the largest foreign student group.

- **Migration & Culture:**

- Skilled Indian professionals integrate well into German workforce.
- Language proficiency and cultural outreach enhance bilateral goodwill.

- **Balanced Mobility:**

- India seeks reciprocal inflow of German talent—key to long-term partnership.
- Joint investment in **youth and education** seen as future drivers of cooperation.

### Green Development and Climate Cooperation

- **Green and Sustainable Development Partnership (GSDP):**

- Germany pledged **€10 billion (2022–2032)** for India’s climate initiatives.

- Supports renewable energy, urban sustainability, biodiversity, and EVs.

- **Technology and Industry Linkage:**

- German firms aid India’s energy transition—wind turbines, solar deployment.
- Site visits in Gujarat reflect expanding ground-level engagement.

- **Global Commitments:**

- Aligns with SDG 13 (Climate Action) and India’s Paris **Agreement targets**.
- Joint efforts in multilateral platforms (UNFCCC, G20, IRENA).

### Challenges and Future Outlook

Challenge	Way Forward
FTA delays with EU	Push for early closure with German support
Trade imbalance	Promote MSME linkages and tech-based services
Cultural and language barriers	Promote bilingual exchanges, student facilitation
Strategic autonomy concerns	Maintain balanced relations with both EU and Global South

### Conclusion

- The India-Germany partnership, now in its **silver jubilee**, is a model of **value-based, multi-dimensional diplomacy**. With shared interests in **green growth, strategic stability, and knowledge economies**, it is poised to become a pillar of **India’s engagement with Europe and the Indo-Pacific**.

- As India rises on the world stage, partnerships like that with Germany—rooted in trust, technology, and transformation—will shape the architecture of a multipolar, sustainable future.

## ECINET: ECI's Unified Digital Dashboard for Election Management

### Context:

- The **Election Commission of India (ECI)** is set to roll out **ECINET**, a **single-point digital dashboard**, by the time of the **Bihar Assembly elections**, with partial rollout during the **June 19, 2025 by-elections** in four states.

### Relevance: GS Paper II

#### What is ECINET?

- A **centralized digital platform** developed by the **Election Commission of India**.
- Integrates and replaces over **40 existing mobile/web applications**.
- Provides **one-stop access** for **electors, political parties, civil society, and ECI officials**.

### Key Features:

Feature	Details
<b>Unified Access</b>	<ul style="list-style-type: none"> <li>Merges apps like <b>Voter Helpline, cVIGIL, Suvidha 2.0, ESMS, Saksham, KYC App</b> into one</li> </ul>

<b>User-Friendly UI/UX</b>	<ul style="list-style-type: none"> <li>Simplified interface for better navigation and accessibility</li> </ul>
<b>Accuracy and Legality</b>	<ul style="list-style-type: none"> <li>Data entry only by <b>authorized officials</b>; governed by <b>RPA Acts and ECI rules</b></li> </ul>
<b>Legal Compliance</b>	<ul style="list-style-type: none"> <li><b>Aligned with:</b> <ul style="list-style-type: none"> <li>Representation of People Act (1950, 1951)</li> <li>Registration of Electoral Rules (1960)</li> <li>Conduct of Election Rules (1961)</li> <li>ECI circulars and SOPs</li> </ul> </li> </ul>

### Benefits of ECINET:

- Reduces burden of managing multiple apps
- Increases **transparency, accessibility, and efficiency** in election processes
- Offers **real-time electoral data** on smartphones or desktops
- Enhances **data integrity and authenticity**
- Covers **~100 crore electors** and **lakhs of officials** and agents involved in elections

### Key Electoral Reforms Linked to ECINET:

Reform	Objective
<b>Integration with Registrar General of India</b>	Real-time removal of <b>deceased voters</b> from rolls
<b>Polling Station Reforms</b>	

## India-Pakistan Conflict: Strategic and Technological Dimensions

- Max electors per booth reduced from **1,500 to 1,200**
- Additional booths in **high-density areas**
- No voter to travel more than **2 km** to vote
- **Redesigned Voter Information Slips**
- Enhanced visibility of **serial/part numbers**
- **Mobile Phone Deposit Facility**
- At all polling stations for **ease of voting**
- **Grassroots Officer Training**
- Ensures **uniform conduct** of elections across India

### Significance of ECINET:

- Addresses **Opposition concerns** over voter roll anomalies, duplications, and suppression.
- Modernizes India's **election tech ecosystem**.
- Serves nearly:
  - **10.5 lakh Booth Level Officers (BLOs)**
  - **15 lakh Booth Level Agents (BLAs)**
  - **45 lakh Polling Officials**
  - **4,123 Electoral Registration Officers (EROs)**
  - **767 District Election Officers (DEOs)**

### Conclusion:

- **ECINET** reflects India's transition toward **tech-integrated governance**, aiming to streamline the world's largest democratic process with **transparency, inclusiveness, and real-time access**.

### Context

- In **early May 2025**, a brief yet intense military conflict erupted between **India and Pakistan**, triggered by cross-border provocations and escalating hostilities. Though short-lived, the conflict underlined enduring regional instability and introduced new dynamics in **technological warfare**. It highlighted the continuing belligerence of Pakistan, its military dominance in civilian affairs, and the importance of preparedness in a multipolar world.

### Relevance for UPSC

- **GS Paper II:** India and its neighborhood – relations; Effect of policies and politics of developing countries.
- **GS Paper III:** Internal Security, Cyber & Space Security, Role of Technology in warfare.

### Key Aspects of the India-Pakistan Conflict

1. **Pakistan's Military Mindset and Strategic Belligerence**
  - Despite internal crises and economic instability, **Pakistan's military** remains the dominant force in governance.
  - The **army chief's recent statement** reaffirming Pakistan as a **religious state** highlights ideological antagonism toward India.

- Civilian leaders like Shehbaz Sharif are seen as figureheads; real power lies with the military.
- India continues to face the risk of being destabilized by **proxy wars**, **terror infiltration**, and military adventurism.

## 2. Geopolitical Double Standards and External Influence

- The **global reaction to conflicts** — such as Ukraine vs Gaza — shows **inconsistency** in humanitarian concern and strategic interest.
- Alleged U.S. mediation in the conflict suggests an underlying interest in **Pakistan's critical minerals** like lithium and rare earths.
- This indicates how **geoeconomics and critical minerals diplomacy** now play into conflict resolution narratives.

## 3. Technological Dimensions of Modern Warfare

- **Drones and AI-based warfare** were extensively used — including Turkish Songer drones, Chinese J-10C, and Indian Kamikaze drones.
- The emergence of **multi-layered air defence systems**: India's **Akash, Barak, S-400**, and airborne surveillance proved decisive.
- **Kill-chain effectiveness**, system integration, and **electronic warfare (ECM/ECCM)** played crucial roles.
- The conflict served as a **live-testing arena** for global military suppliers — from Western to Chinese systems.

## 4. Space and Escalation Dominance

- The need for **escalation dominance** — rapid mobilization and response — was evident.
- India currently holds an edge but **cannot be complacent** given evolving threats.
- The conflict underscored India's **critical gaps in space-based surveillance and dedicated satellite systems**, essential for:
  - Real-time targeting
  - Early warning systems
  - Secure communication
- **Space has emerged as the new domain of warfare** — alongside land, air, sea, and cyber.

## 5. Nuclear Threshold and Strategic Deterrence

- There's a narrowing **nuclear threshold**, with both sides possessing strategic weapons.
- The increasing role of **cruise missiles and hypersonic systems** makes **arms control treaties** less effective.
- India's **BrahMos deterrence** remains unmatched regionally, though it was not deployed in this skirmish.

## Conclusion

- The recent India-Pakistan conflict was more than a border skirmish — it was a **signal of future warfare trends**. It revealed the **fragility of peace** in South Asia, the **entrenched militarism of Pakistan**, and the growing importance of **technology and space assets** in national defence. For India, **strategic foresight**, **technological upgradation**, and **geopolitical**

**vigilance** are imperative to maintain deterrence and regional stability. Long-term peace depends not only on India's strength but also on global pressure to democratize Pakistan and check its military adventurism.

## Centre asks States to raise enrolment in govt. schools

### Context

- The **Union Education Ministry** flagged a “disturbing trend” of students shifting from **government to private (unaided) schools** in at least 11 **States and UTs**.
- Notable states include: **Telangana, Uttarakhand, Tamil Nadu, Andhra Pradesh**.
- This trend raises questions on the **quality of public schooling** and **public confidence** in State-provided
- The issue was flagged during **Project Approval Board (PAB) meetings** held in March–April
- These meetings were convened to assess the **Annual Work Plan and Budget (AWP&B)** for 2025-26 under the **Samagra Shiksha**
- Data presented was from **UDISE+ (Unified District Information System for Education Plus) 2023– 24**, a government system for data-driven educational planning.
- **Recommended:**
  1. Root-cause analysis
  2. **Policy-level interventions**
  3. **Improved quality and perception** of public education

## What is Samagra Shiksha Abhiyan?

### About:

- Introduced in the Union Budget 2018-19, **Samagra Shiksha** is a comprehensive program covering education from **pre-nursery to Class 12** to ensure equitable learning outcomes.
  - Supported by central funds under the **Concurrent List** (Art. 42, 45, 21A).

### Key Features:

- **Integration of Schemes:** It subsumes three earlier schemes:
- **Sarva Shiksha Abhiyan (SSA):** Focused on universal primary
- **Rashtriya Madhyamik Shiksha Abhiyan (RMSA):** Aimed at secondary
- **Teacher Education (TE):** Focused on training
- **Sector-Wide Development Approach:** It streamlines implementation across **all levels (state, district, and sub-district)** instead of fragmented project-based objectives.
- **Alignment with SDGs:** Ensures free, equitable, and quality education (**SDG 1**) while eliminating gender disparities and ensuring access for vulnerable groups (**SDG 4.5**).

### Implementation:

- It is a **centrally sponsored scheme (CSS)** implemented through a **single State Implementation Society (SIS)** at the **State/UT level**.
  - SIS is a **state-registered body** implementing **CSS** and **development programs**.

## What is United District Information System for Education (UDISE+)?

- UDISE+ is one of the largest Management Information Systems initiated by the Department of School Education and Literacy (DoSEL), Ministry of Education, Government of India, covering more than 14.72 lakhs of schools, 98.08 lakhs of teachers, and 24.80 crores of children.
- UDISE+ is an online portal facility created by DoSEL for record of data related to schools, teachers, enrolment, infrastructure, in respect of all recognized schools in the country.
- In UDISE+ school wise data is captured through Data Capture Format (DCF).
  - Each school has been provided with a login ID and password for facilitating online data compilation by respective schools.
  - The Head Teacher/ Head Master of the school in all the States compiles the data, and it goes through a 3-stage validation/verification process, viz., Block/ Cluster level, District level, and State level.
  - This data is finally certified by the State Project Director (SPD) at the State level.
  - The data once certified by SPD of the respective State is considered as approved by the State.
  - Therefore, data is entered in the UDISE+ portal by the respective State itself.
- UDISE+ data is the only pan-India and most trusted database in school education in the country.

# GENERAL STUDIES - III

- 1. Indian Economy**
- 2. Agriculture And Food**
- 3. Environment And Biodiversity**
- 4. Science And Technology**
- 5. Disaster Management**
- 6. Internal Security**

### India's Industrial Slowdown

#### Context:

- Recently, India saw a drastic downfall in its industrial growth. It went down to 4% in the FY25.

#### Relevance:

- GS-03 (Growth and Development, Industries)

#### Dimensions of the Article:

- What Drives Industrial Growth in India?
- What's Holding Back Industrial Growth?
- Way forward

#### What Drives Industrial Growth in India?

- A rise in domestic investment for capital-intensive sectors like electronics and auto components has boosted investor confidence in India's manufacturing capabilities.
  - ₹37 lakh crore domestic investment in FY24.
  - FDI inflows are strong in the automobile, electronics, and pharma sectors.
- Technology and innovation in AI and automation have helped India improve its productivity, signalling tech-driven growth.
  - Industry 4.0 (AI, automation, IoT) is improving productivity.
  - Electronics manufacturing grew at a 17.5% CAGR (FY15–24).

- HSBC Manufacturing PMI touched 59.1 in March 2024 (a 16-year high).
- Policy pushes and Reforms have helped India to accelerate its industrial sector in sectors like pharmaceuticals, electronics, etc.
  - It has boosted investor confidence.
  - FDI in manufacturing hit ₹14.45 lakh crore (US\$165 billion), a 69% rise in a decade.
  - Aim: Raise manufacturing share in GDP to 25% by 2025.
- India's rising middle class and their demand have given a kick-start to sectors like electronics, pharma, and auto.
  - Consumer durables have increased from **3.6% (FY24)** to **8% (FY25)**.
  - Exports of non-petroleum goods also improved YoY.
- Infrastructure Growth
  - Smart cities, highways, and PM Gati Shakti are aiding core sectors.
  - Steel production rose 3.3% in Apr–Nov FY25; cement demand is surging.
- Geostrategic Export Leverage
  - Mobile phone exports grew 92%, hitting \$5 billion by Aug FY24.
  - Gati Shakti and the Logistics Policy aim to cut supply chain costs.
- Green Manufacturing
  - ₹20,000 crore allocated in Budget 2025-26 for solar and nuclear power.
  - EV sector boosted via PM E-DRIVE initiative.

#### What's Holding Back Industrial Growth?

- Global Shocks and Trade Conflicts
  - The IMF slashed India's growth forecast to 6.2% for FY26.

- Reciprocal US tariffs could cost India ~\$14 billion in exports.
- Rural Demand Weakness
  - Rural food inflation: 8.65% vs. 7.9% urban (Dec. 2024).
  - Reduced rural consumption = slower FMCG and agro-industry growth.
- High Logistics Costs
  - India's logistics cost: 14–18% of GDP vs. 8–10% in developed nations.
  - Poor last-mile connectivity and storage increase costs.
- Regulatory Burden
  - MSMEs face difficulties in compliance, finance, and permits.
  - Excessive regulation hinders innovation and formalisation.
- Skill Gap
  - 29 million skilled worker shortage in industrial sectors.
  - Despite PMKVY, the training does not match industry needs.
- Sustainability vs Growth Dilemma
  - 55% of electricity still comes from coal.
  - Green tech adoption is slow due to high initial costs.
- Global Competition
  - India's global manufacturing share: only 2.8%.
  - Faces stiff competition from China and Vietnam.
  - Still exports low-value raw materials, like iron ore, instead of finished goods.
- Startup Focus Misaligned
  - Many startups focus on low-impact sectors (e.g., food delivery).
  - Need more in semiconductors, AI, 3D printing, and robotics.

### Way Forward:

- Encourage MSMEs to adopt Industry 4.0 tools via tax rebates and digital upskilling. This will reduce operational inefficiencies and make them globally competitive.
- Tailor skill programs for sunrise sectors—AI, robotics, EVs, etc.—and build training partnerships with industry and academia. Align vocational education with market-ready skill sets.
- Encourage green manufacturing through targeted PLI schemes for clean tech, EV subsidies, and carbon credit markets. Integrate sustainability into industrial policy itself.

### Also know:

#### “Energy Statistics India 2025.”

- Recently, the National Statistics Office (NSO) published its Energy Statistics India 2025 report.
- The report provides data on coal, petroleum, natural gas, and other renewables that includes their reserves, capacity, production, consumption, and import/export.
- Energy Account and SEEA Framework:
  - A new chapter was introduced on energy accounts using the System of Environmental Economic Accounting (SEEA), 2012 framework.
  - Includes asset accounts and physical supply and use tables for FY 2022-23 and 2023-24.
- Renewable Energy Potential and Growth:
  - India's renewable energy potential stands at 21,09,655 MW as of 31-Mar-2024.
  - Wind Power dominates (55%) with 11,63,856 MW, followed by Solar

Energy (7,48,990 MW) and Large Hydro (1,33,410 MW).

- States with highest potential: Rajasthan (20.3%), Maharashtra (11.8%), Gujarat (10.5%), Karnataka (9.8%).
- Growth in Renewable Energy Capacity and Generation:
  - Installed capacity for renewable energy increased from 81,593 MW in 2015 to 1,98,213 MW in 2024 (CAGR of 10.36%).
  - Gross electricity generation from renewables grew from 2,05,608 GWh (2014-15) to 3,70,320 GWh (2023-24) (CAGR of 6.76%).
- Energy Efficiency and Consumption Trends:
  - Per capita energy consumption increased from 14,682 MJ/person (2014-15) to 18,410 MJ/person (2023-24) (CAGR of 2.55%).
  - Transmission and distribution losses reduced from 23% (2014-15) to 17% (2023-24).
  - Industry sector remains the largest energy consumer, growing from 2,42,418 KToE (2014-15) to 3,11,822 KToE (2023-24).

## Standing Deposit Facility (SDF)

### Context:

- The **Standing Deposit Facility (SDF)**, introduced by the Reserve Bank of India in **April 2022**, completes three years as a key tool in India's liquidity management framework.

### Relevance: GS-03 (Economy)

### What is SDF?

- It is a **monetary policy instrument** used by the RBI to **absorb surplus liquidity** from the banking system **without providing collateral**.
- Replaced the **Fixed Rate Reverse Repo** as the **floor** of the Liquidity Adjustment Facility (LAF) corridor.
- Functions as an **overnight liquidity absorption tool** but with **flexibility** to extend the tenure.
- Open to **all LAF-eligible entities** and operates **365 days a year**, including holidays.

## Vultures

### Context:

- Recently, 34 vultures, which are under the critically endangered category, were relocated from the Vulture Conservation Breeding Centre (VCBC) in Pinjore, Haryana, to Maharashtra.
  - The initiative was an effort to support regional vulture reintroduction efforts.

### Relevance: GS-03 (Conservation)

### Key Highlights:

- VCBC was established in 2001 under the UK's Darwin Initiative.
- A joint project of the Haryana Forest Department and the Bombay Natural History Society (BNHS).

- Focused on conserving three vulture species: white-backed, long-billed, and slender-billed.
- Located near Bir Shikargaha Wildlife Sanctuary, Haryana.
- Played a key role in confirming diclofenac as the primary cause of vulture deaths.

### About Vultures species in India:

- Vultures are one of the largest scavenger birds.
- They are majorly found in the tropics and the subtropics.
- Vultures play an important role in disposing of nature's waste and help keep the environment clean of waste.
- India is home to 9 species of vulture: long-billed, Oriental white-backed, slender-billed, Himalayan, Egyptian, bearded, cinereous, Eurasian Griffon and red-headed.
- Special characteristic features:
  - They keep the wildlife diseases in check due to its special strong stomach. Its stomach contains very acidic digestive juices that can kill bacteria and viruses that otherwise could cause diseases like anthrax, rabies, and botulism, thus acting as a true “dead end” for pathogens.
  - They also help in decomposing organic matter and help the soil to return its nutrients back. This benefits plant growth and the overall health of the ecosystem.
  - They are also known as indicative species and they are very sensitive to changes. Their increase or decrease in the population is an indicator of a wider ecological problem.

## RNA-based antiviral agent

### Context:

- **Germany-based researchers have developed an RNA-based antiviral agent using RNA silencing techniques** to protect plants, especially against the **Cucumber Mosaic Virus (CMV)**, which causes **25–30% banana crop loss in India**.

### About the Antiviral Agent and Techniques Used:

Researchers are leveraging **RNA interference (RNAi)** to enhance plant immunity:

- **Host-Induced Gene Silencing (HIGS):**
  - Plants are genetically modified to **produce double-stranded RNA (dsRNA)** that targets viral genes.
  - Provides **lifelong protection** without needing reapplication.
- **Spray-Induced Gene Silencing (SIGS):**
  - **RNA sprays** are applied to plant leaves.
  - RNA is absorbed and triggers the **plant's immune system—no genetic modification** needed.

### How Plants Use RNA Silencing Against Viruses:

- When a virus infects a plant, it introduces **dsRNA**.
- The plant detects this and activates **Dicer-like enzymes (DCLs)** to chop the dsRNA into **small interfering RNAs (siRNAs)**.

- These **siRNAs** guide the plant's cellular machinery to **degrade the viral RNA**, halting infection.
- However, viruses can **mutate quickly**, making some siRNAs ineffective.

### What is RNA silencing?

- RNA silencing is a natural **gene regulation process** that uses **siRNA or miRNA** to degrade or suppress **target RNA (mRNA)**.
- This prevents the mRNA from producing harmful or unwanted proteins.
- Acts as a **defence mechanism in plants** and other organisms against viruses.

## RBI issued guidelines on Microfinance Institutions (MFIs)

### Context

- Recently, the RBI issued guidelines on how Microfinance Institutions (MFIs) must be regulated. It suggested three key categories: pricing, over-indebtedness, and conduct.

### Relevance: GS-03 (Economy)

### Key Features of the Guidelines

- **Loan Pricing:**
  - MFIs must adopt transparent and board-approved interest rate policies.
  - Rates should be justifiable and not exploitative.

- **Over-Indebtedness Control:**
  - A borrower cannot take microfinance loans from more than three lenders in total.
- **Conduct & Discipline:**
  - MFIs are barred from offering fresh loans to clients defaulting for over 60 days with any lender.

### About Microfinance (Microcredit)

- **Definition:** Small loans provided to low-income individuals or groups with limited access to traditional banking.
- **Services Offered:** Microcredit, savings, micro-insurance, and remittance.
- **Origin:** Concept popularized by Grameen Bank in Bangladesh (1983), founded by Muhammad Yunus.

### Regulatory Framework in India

- **Self-Regulatory Organizations (SROs):** MFIN and Sa-Dhan recognized by RBI in 2014.
- **RBI's 2022 Framework:** Set definitions, pricing rules, repayment caps, and conduct norms for MFIs.

## India's First Genome-Edited Rice Varieties

### Context

- India became the first country in the world to develop genome-edited rice varieties without a foreign DNA.
  - The ICAR developed the **first genome-edited** rice varieties: **DRR Dhan 100 (Kamala)** and **Pusa DST**

**Rice 1**, using CRISPR-Cas genome editing

### Relevance:

### GS-03 (Science and technology)

### About the New Varieties

#### 1. DRR Dhan 100 (Kamala)

- Developed by: ICAR – Indian Institute of Rice Research (IIRR), Hyderabad
- Base variety: Improved version of Samba Mahsuri
- Target gene: CKX2 (Cytokinin Oxidase 2) – controls cytokinin, a hormone regulating plant growth and cell division.

#### 2. Pusa DST Rice 1

- Developed by: ICAR – Indian Agricultural Research Institute (IARI), New Delhi
- Base variety: Improved MTU1010 (Cottondora Sannalu)
- Enhanced drought and stress tolerance traits.

### What is Genome Editing?

- Genome editing, also known as gene editing, consists of technologies that enable scientists to modify an organism's DNA. These technologies allow for the addition, removal, or alteration of genetic material at specific locations within the genome.
- **CRISPR Technology:** One of the most advanced tools is the CRISPR-Cas9 system, which allows for precise genome editing. This technology has revolutionized plant breeding, enabling agricultural scientists to insert specific traits into the gene sequence.

### Types of Genome Editing:

Genome editing is categorized into three types based on the nature of the edits:

- **SDN 1:** Introduces small insertions or deletions in the DNA without adding foreign genetic material.
- **SDN 2:** Uses a small DNA template to create specific changes, still without foreign genetic material.
- **SDN 3:** Involves adding larger DNA elements or full genes from foreign sources, similar to the development of genetically modified organisms (GMOs).

### What is CRISPR and Its Applications?

- CRISPR is a gene-editing tool allowing scientists to make precise changes in a plant's genome.
- It stands for Clustered Regularly Interspaced Short Palindromic Repeats.
- CRISPR-Cas9 edits the parts of the genome by either removing, adding or altering sections of the DNA sequence.
  - It has two key molecules –
    - Cas9 – This enzyme acts as a 'molecular scissors' that can cut the two strands of DNA at a specific location in the genome.
    - Guide RNA (gRNA) – The gRNA work is to find and bind to the specific sequence in the DNA.
- The guide RNA guides the Cas9 to the same location in the DNA sequence and allows Cas9 to make a cut across both strands of the DNA.

- At this stage, the cell recognises that the DNA is damaged and tries to repair it.
- The DNA repair machinery is used to introduce changes to one or more genes in the genome of a cell of interest.
- The technology replicates a natural defence mechanism in some bacteria that uses a similar method to protect itself from virus attacks.
- **Applications in GM Crops:**
  - Reduces development costs by making targeted genetic modifications.
  - Creates GM crops without introducing foreign genes, improving public acceptance.
  - Equips crops with stacked resistance genes to combat pest and weed resistance effectively.

## Climate Change and Human Gut Health: A New Path to Illness

### Context

- A recent review article in *The Lancet Planetary Health* has raised concerns about how climate change is not only affecting food security but also disrupting the **human gut microbiome**, which is critical for nutrition, immunity, and mental health. Rising temperatures, declining food quality, and ecological stressors are contributing to **gut dysbiosis** (microbial imbalance), potentially

leading to malnutrition, chronic diseases, and neurological disorders.

### Relevance

- **GS Paper 3 – Environment, Health, Science & Technology**

### Gut Microbiota and Its Role in Human Health

- **Human microbiome** consists of over **100 trillion microbes**, especially in the gut.
- They regulate:
  - **Immunity**
  - **Metabolism and digestion**
  - **Vitamin synthesis (e.g., B and K)**
  - **Neurological health (gut-brain axis)**
- Microbial diversity is key. Loss of diversity (dysbiosis) can lead to:
  - **Obesity**
  - **Diabetes**
  - **Inflammatory bowel disease (IBD)**
  - **Neurological issues (e.g., Parkinson's, Alzheimer's)**

### Impact of Climate Change on Food and Nutrition

- Higher **CO<sub>2</sub> levels** reduce **micronutrients** in plants:
  - Zinc, iron, potassium, phosphorus
  - Protein concentrations fall in crops like wheat and rice
- **Heatwaves and droughts** reduce food availability and push populations into nutritional stress.

- Diets with **low diversity** and high processed content disrupt gut microbial balance.

### Climate Stress and Its Indirect Impact on Gut Health

- **Heat stress** alters gastrointestinal function and microbial composition.
- **Mental stress and pollution**, linked with climate change, are known to disrupt microbiota.
- **Wildfires and air pollution** increase inflammation, impacting gut-lung and gut-brain interactions.

### Most Vulnerable Populations

- **Low- and Middle-Income Countries (LMICs):**
  - Face multiple climate shocks: drought, food scarcity, rising temperatures
  - Children, elderly, and pregnant women are most at risk
- **Undernutrition** leads to poor microbiome development in children, affecting lifelong health.

### Current Scientific Understanding and Research Gaps

- Over **90% of gut microbes remain uncultured**; unknown how they respond to climate triggers.
- Most data are **from high-income countries**, leaving climate-vulnerable populations understudied.
- **Need for longitudinal studies** to understand how changes in diet and environment affect gut health over time.

### Gut-Brain-Immune Axis: Systemic Health Effects

- **Gut-brain axis:** Changes in microbiota can lead to anxiety, depression, and cognitive disorders.
- **Gut-immune axis:** Weakened microbiota compromise immunity, increasing susceptibility to infections.
- **Neuroinflammation and autoimmune disorders** may be linked to long-term gut disruption.

### The Dysbiosis-Disease Chain

- Climate change → Poor crop nutrition → Malnutrition → Gut dysbiosis → Chronic diseases (diabetes, IBD, neurological disorders)

This highlights an emerging **public health concern**, requiring global attention and integrated responses.

### Way Forward

#### Focused Microbiome Research

- Invest in **global gut microbiome mapping**, especially in LMICs.
- Encourage **multidisciplinary teams** to study food-climate-microbe-health relationships.

#### Nutritious and Climate-Resilient Food Systems

- Promote **biofortification** and **crop diversification**.
- Ensure access to **plant-based, fiber-rich, unprocessed diets** to support microbiota.

#### Adopt One Health Approach

- Integrate human, environmental, and animal health policy.

- Use early-warning systems for climate-linked health risks, including microbial threats.

#### Policy and Global Cooperation

- Include gut health indicators in **nutrition and public health programs**.
- Link climate adaptation funding to health and nutrition goals.

#### Public Awareness and Local Solutions

- Educate communities on the importance of diverse, fiber-rich diets.
- Use **AYUSH, traditional diets**, and community-based nutrition to boost resilience.

Here's the **rewritten and structured version** of your content for **UPSC GS-2/3 Current Affairs Notes**, following a crisp and analytical format:

## India–UK Free Trade Agreement (FTA): Strategic and Economic Implications

### Context

- India and the United Kingdom have signed a **landmark Free Trade Agreement (FTA)** in 2025 after nearly three years of negotiations, marking a major development in bilateral economic relations and India's evolving trade strategy.

### What is a Free Trade Agreement (FTA)?

- An FTA is a **pact between two or more countries** aimed at reducing or eliminating **customs duties, tariffs,**

**and non-tariff barriers** on substantial bilateral trade.

- FTAs may also cover:
  - **Trade in services**
  - **Investment flows**
  - **Mobility of professionals**
  - **Regulatory cooperation**

### Highlights of the India–UK FTA

#### Tariff Elimination

- **99% of Indian exports** to the UK to become **tariff-free**.
- **Key beneficiaries:**
  - Textiles and garments
  - Leather and footwear
  - Marine products
  - Toys and sports goods
  - Gems and jewellery
  - Engineering goods and auto components
  - Organic chemicals

#### Services Sector Gains

- UK has provided its **most liberal market access** commitments so far to India.
- Indian professionals **exempted from UK social security contributions** for up to 3 years — reducing employment costs.

#### Mobility and Visas

- Simplified **visa norms** and intra-corporate transfer rules.
- **Special quotas** for Indian workers in select high-demand UK sectors.

## Gains for the UK

- **Whisky and Gin:** Tariffs reduced from 150% to 75% immediately; further cut to 40% over 10 years.
- **Cars:** Import duties reduced to 10% under a **quota system**.
- Additional sectors benefiting:
  - Medical devices, cosmetics, aerospace
  - Electrical machinery, chocolate, soft drinks, lamb

## Strategic Significance

### Post-Brexit Realignment

- The UK is seeking **new bilateral trade agreements** after losing EU access. India offers a large, growing market.

### China-Plus-One Strategy

- Western nations including the UK are **diversifying supply chains** to reduce overdependence on China.

### India's Global Trade Strategy

- Part of India's effort to:
  - Diversify trade ties
  - Reduce reliance on China
  - Avoid multilateral blocs like **RCEP** (India exited over trade imbalance concerns)

### Geopolitical and Economic Stability

- Amid US trade tensions and global uncertainties, this FTA creates a **stable, rules-based trade framework**.

## Concerns and Challenges

### Marginal Tariff Advantage

- As per **Global Trade Research Initiative (GTRI)**:

- Many Indian exports already enjoyed low or zero tariffs.
- Additional economic gains may be limited.

### UK's Environmental Tariffs

- UK's **proposed carbon border tax** on high-emission imports (e.g., metals) could:
  - Act as **non-tariff barriers**
  - Hurt India's price competitiveness
  - Require future negotiation

## Conclusion

- The India–UK FTA is a **strategic milestone** in India's broader trade realignment and economic diplomacy.
- While **immediate trade gains** may be moderate, the FTA lays the foundation for:
  - Enhanced services and investment cooperation
  - Skill mobility
  - Integration with developed economies
- **Implementation, negotiations, and institutional follow-up** will be critical to realizing its full long-term potential.

## Thalassemia: A Public Health Challenge

### Context

- On **World Thalassemia Day** awareness campaigns highlighted the pressing need to improve early diagnosis, preventive screening, and management of thalassemia, a major

inherited blood disorder affecting millions globally, particularly in South Asia.

### What is Thalassemia?

- Thalassemia is a **hereditary disorder** affecting the production of **haemoglobin**, the oxygen-carrying protein in red blood cells. Individuals with this disorder either produce **less haemoglobin** or **abnormal forms** of it, leading to **anaemia and oxygen deficiency** in tissues.

### Causes and Genetic Basis

- Caused by **mutations or deletions** in the genes responsible for haemoglobin chain synthesis (alpha or beta).
- It is **inherited in an autosomal recessive manner**, meaning a child must inherit the defective gene from **both parents** to develop the severe form.
- Carriers (thalassemia minor) usually show no or mild symptoms but can pass the gene to offspring.

### Types of Thalassemia

#### 1. Alpha Thalassemia:

- Caused by deletions in up to **four alpha-globin genes**.
- Common in people of **Southeast Asian, Middle Eastern, and African** descent.
- Severity varies based on the number of affected genes.

#### 2. Beta Thalassemia:

- Due to mutations in the **beta-globin gene**.

- More prevalent in **Mediterranean, South Asian, and Chinese** populations.
- Includes:
  - **Thalassemia Minor** – usually asymptomatic or mild anaemia.
  - **Thalassemia Major (Cooley's Anaemia)** – severe anaemia requiring **lifelong transfusions**.

### Symptoms

- **Chronic fatigue and weakness**
- **Pale or jaundiced skin**
- **Facial bone deformities**
- **Growth retardation in children**
- **Enlarged spleen and liver**
- **Breathlessness**

### Health and Societal Impact

- Affects both **life expectancy** and **quality of life**, especially in untreated major cases.
- Causes significant **emotional, financial, and social stress** on families.
- In developing regions, lack of awareness and screening leads to a **higher disease burden**.

### Treatment Options

#### 1. Supportive Therapies

- **Regular blood transfusions** to maintain haemoglobin levels.
- **Iron chelation therapy** to manage iron overload from transfusions.

#### 2. Curative Options

- **Bone marrow/stem cell transplant** – the only definitive cure, but with limited accessibility and success rates.

### 3. Other Measures

- **Genetic counselling and prenatal screening** to prevent disease transmission.
- **Vaccinations, nutritional support, and psychological care** as part of holistic management.

### Way Forward

- **Nationwide carrier screening programmes** to identify at-risk couples.
- Integration of thalassemia care into **public health services** under schemes like Ayushman Bharat.
- Promotion of **research and indigenous treatment innovations**.
- Strengthening **awareness, blood donation systems**, and counselling infrastructure.

## India's Demographic Transition: Insights from the SRS Report 2021

### Context and Importance

- On May 7, 2024, the **Registrar General of India (RGI)** released the **Sample Registration System (SRS) Statistical Report for 2021**, presenting critical demographic trends in fertility, mortality, and age distribution across India. While the **Census 2021** remains delayed, the SRS offers the most reliable annual estimates of fertility and mortality indicators.
- The findings have significant implications for India's **population policy, economic planning, aging**

**population management**, and the framing of **welfare policies**.

### Key Highlights from the SRS Report 2021

#### 1. Total Fertility Rate (TFR) at Replacement Level

- **TFR remained at 2.0 in 2021**, same as 2020.
- The **replacement level fertility** is considered to be **2.1**, i.e., the rate at which a population exactly replaces itself from one generation to the next.
- India has **achieved below-replacement fertility**, suggesting **stabilising population growth**.

#### State-wise Data

- **Highest TFR:** Bihar (3.0) – above replacement level.
- **Lowest TFR:** Delhi and West Bengal (1.4) – well below replacement level.
- Other low TFR states: Tamil Nadu, Andhra Pradesh, Kerala, Jammu & Kashmir, Maharashtra, Karnataka, and Telangana – all below 1.6.

#### 2. Shrinking Child Population

- The population in the **0-14 age group declined from 41.2% in 1971 to 24.8% in 2021**.
- This reflects a significant **demographic transition** and correlates with falling fertility rates and rising age at marriage.

#### 3. Rising Working-Age Population (Demographic Dividend)

- The **15-59 age group**, considered the **economically productive**

population, increased from **53.4% to 66.2%** between 1971 and 2021.

- India is currently experiencing a **demographic dividend phase**, providing a crucial opportunity for economic growth if harnessed effectively.

#### 4. Growing Elderly Population

- The **60+ population rose from 6% to 9%**; the **65+ category** increased from 5.3% to 5.9%.
- Reflects **improving life expectancy**, but also signals upcoming challenges in healthcare, pensions, and geriatric welfare.

##### State-wise Elderly Data

- **Highest elderly population:** Kerala (14.4%), Tamil Nadu (12.9%), Himachal Pradesh (12.3%).
- **Lowest elderly population:** Bihar (6.9%), Assam (7%), Delhi (7.1%).

#### 5. Increasing Age at Marriage

- The **mean age at effective marriage for women increased from 19.3 years in 1990 to 22.5 years in 2021**.
- This trend has strong linkages with education, employment opportunities, and fertility reduction.

### Relevance for Governance and Policy

#### 1. Population Stabilisation vs. Growth Debate

- The **TFR at 2.0** contradicts the political narrative of "fast population growth" used to justify restrictive population control policies.

- Instead, India faces a more nuanced **population ageing challenge** in the coming decades.

#### 2. Implications for Economy

- The rising **working-age population (66.2%)** presents a **window of economic opportunity**, but it is **time-bound**.
- Without investments in **education, skilling, and employment generation**, the demographic dividend may turn into a liability.

#### 3. Elderly Welfare and Social Security

- With rising **life expectancy** and a **growing elderly population**, India must prepare robust policies for:
  - **Pension coverage**
  - **Healthcare access**
  - **Age-friendly infrastructure**
  - **Social inclusion**

#### 4. Women's Empowerment

- Rising age at marriage indicates **positive progress in gender equality**, female education, and reproductive health.
- Policies like **Beti Bachao Beti Padhao** and expansion of **women's education** must be sustained and strengthened.

#### 5. Need for Comprehensive Data: Census Pending

- Despite the SRS insights, a **full picture requires the Census**, which has been delayed since 2021.
- The lack of **granular demographic and caste data** hampers planning, especially in areas like **urbanisation, migration, and intra-State disparities**.

## Conclusion:

### A Demographic Turning Point

- The **SRS 2021** data tells a compelling story: **India is no longer a high-fertility country**, and is on the cusp of **demographic maturity**. While falling fertility is a sign of development, the simultaneous rise in the elderly population and shifting age structure require **urgent policy adaptations**.
- This moment is a **turning point** in India's demographic journey — from population explosion concerns to challenges of **aging, urbanisation, and productivity enhancement**. The need for a **data-driven, inclusive population policy** is more critical than ever.

## Modal Shift in Transport – Changing Dynamics of Transportation in India and the World

### Context

- Traditional transportation choices are driven by convenience, comfort, and cost. However, growing environmental concerns and climate commitments have led to a global push for a **modal shift**—from road and air transport to railways, for both freight and passenger movement.

### Relevance

- Important for achieving India's climate goals and net-zero target by 2070
- Helps build sustainable and low-carbon urban infrastructure

- Supports efficient, economical, and eco-friendly freight and passenger movement

## Environmental Impact of Different Modes of Transport

### Emission Statistics:

- The transport sector contributes around 25 percent of global energy-related carbon emissions.
- Road transport is the largest emitter of greenhouse gases due to high usage of cars, buses, and trucks.

### CO<sub>2</sub> Emissions per Passenger-Kilometre:

- Cars: 148 grams
- Airplanes: 123 grams
- Buses: 63 grams
- Trains: Only 19 grams

### Freight Efficiency:

- Railways are significantly more energy-efficient and less polluting than trucks.

## Global Trends and Policy Measures

### Declining Use of Railways (2007–2021):

- Global rail freight share declined from 51 percent to 40 percent
- Rail passenger share dropped from 12 percent to 8 percent
- Main reason: Expansion of road transport, especially in countries like India and China

### **Environmental Impact if Trends Continue:**

- Likely 16 percent increase in GHG emissions in low-income countries
- Modal shift to rail could prevent 1.8 billion tonnes of carbon emissions by 2050

### **International Best Practices:**

- European Union aims to shift 30 percent of road freight to rail or inland waterways by 2030, and over 50 percent by 2050
- China is implementing policies to promote rail freight, resulting in reduced emissions and road congestion

### **India's Transport Challenge and Opportunities**

#### **Current Scenario:**

- India has one of the largest railway networks in the world
- Despite this, road transport is gaining preference due to improved infrastructure and last-mile connectivity

#### **Government Initiatives:**

- The National Rail Plan (NRP) aims to increase the modal share of rail freight to 45 percent by 2030
- Significant investments are being made in Dedicated Freight Corridors (DFCs)
- There is a need for a comprehensive strategy to promote passenger rail use as well

#### **Urban Transport Models:**

- Delhi Metro (2021): Reduced 5 lakh vehicles from roads daily, cutting

emissions by 23.82 grams of CO<sub>2</sub> per kilometre

- Mumbai: The metro and monorail share is projected to rise from 2 percent to 36 percent, while motor vehicle usage is expected to decline from 35 percent to 24 percent

### **Climate Goals and Carbon Credit Opportunities**

#### **India's Climate Commitments:**

- Transport sector accounts for 14 percent of India's total greenhouse gas emissions
- A modal shift from road to rail is essential to achieve India's net-zero target by 2070

#### **Carbon Credit Mechanism:**

- Modal shift can help generate carbon credits to fund green transport infrastructure
- Requirements:
  - Proof of additionality (i.e., emissions reduction would not occur without the intervention)
  - No double-counting of emission savings

#### **Energy Source Consideration:**

- For rail to be truly green, electrified trains must be powered by renewable energy, not coal-based electricity

### **Conclusion**

- A modal shift to rail is a critical step toward sustainable development. With the right investments, planning, and policy focus, India can balance economic growth with environmental responsibility. By leading in eco-friendly

transport innovation, India can set a global precedent in sustainable mobility.

**negotiations**, a move rooted in policy decisions during President Trump's administration.

## WHO Pandemic Agreement

### Context:

- In a historic development, the World Health Assembly has officially endorsed the **WHO Pandemic Agreement**; a landmark international treaty aimed at strengthening global readiness for future pandemics.

### What is the WHO Pandemic Agreement?

- This newly adopted accord is a **legally binding international instrument** established under **Article 19 of the WHO Constitution**. Notably, it is only the **second treaty of its kind**, following the 2003 **Framework Convention on Tobacco Control**.
- **Purpose:** To ensure fair access to vaccines, diagnostics, and therapeutics, and to set up a unified global strategy to tackle future health crises.
- **Legal Status:** The agreement will come into force once it is ratified by **at least 60 nations**.
- **Sovereignty Clause:** While the treaty promotes cooperation, countries will retain full authority over their national health decisions. The WHO will not have the power to impose laws or restrictions on member states.
- **Global Participation:** Endorsed by **124 countries**, though **11 nations abstained**. The **United States exited**

### Why Is This Treaty Necessary?

The **COVID-19 pandemic** exposed **significant flaws** in global health equity and coordination mechanisms.

- A **2022 study in *Nature*** estimated that **over 1 million lives** might have been saved if vaccines had been shared more equitably.
- **Wealthy nations were accused of stockpiling vaccines**, leaving low-income countries behind.
- The **Independent Panel on Pandemic Preparedness and Response (2021)** highlighted failures in coordination and fairness as major causes of preventable suffering.

This agreement aims to **rectify such disparities** and prevent repetition in future global health emergencies.

### Core Features of the WHO Pandemic Agreement

- 1. Pathogen Access and Benefit Sharing (PABS)**
  - Countries are required to share pathogen samples and genomic data. In return, pharmaceutical firms must:
    - Allocate **10% of vaccine production free of charge** to the WHO
    - Offer **10% at reduced prices** to poorer nations
- 2. Technology Sharing and Capacity Development**
  - The treaty promotes **technology transfer** and **knowledge-sharing** to

help developing countries manufacture their own vaccines and treatments.

ratification and effective implementation.

### 3. Equity-Focused Allocation

- Aims to **prioritize health needs** over political interests when distributing medical resources.
  - Promotes **fair distribution** of vaccines
  - Encourages **transparency** in supply chains

### 4. Emergency Financing & Logistics Support Proposes the creation of:

- **A Coordinated Financial Mechanism**
- **A Global Supply Chain and Logistics Network (GSCL)**
  - This will ensure **swift access to vital resources** during health emergencies, especially for countries in need.

### 5. Aligning National Health Strategies

- Urges nations to align health policies to ensure that **publicly funded innovations** are accessible during pandemics.

### 6. One Health Integration

- Recognizes the link between **human, animal, and environmental health**, promoting early detection of zoonotic threats.

## Conclusion

- The WHO Pandemic Agreement marks a **significant shift in global public health policy**. It is a response to the painful lessons of COVID-19 and a step towards a **fairer, more coordinated** global response to future pandemics. The true test, however, lies in **timely**

## International Booker Prize 2025: Banu Mushtaq Becomes First Kannada Author to Win

### Context:

- Renowned Kannada writer and activist **Banu Mushtaq** has clinched the prestigious **International Booker Prize 2025** for her powerful short story collection *Heart Lamp*, translated into English by **Deepa Bhashti**.

### About the International Booker Prize 2025

- **Founded:** 2005
- **Organized by:** Booker Prize Foundation, United Kingdom
- **Awarded:** Annually
- **Objective:** Celebrates the finest fiction translated into English from any language across the world.
- **Prize Money:** £50,000, equally divided between the author and the translator.

### Noteworthy Aspects:

- Focuses solely on **translated literary fiction**, setting it apart from the Booker Prize which honors works originally written in English.
- Acknowledges **literary merit, cultural depth**, and the **craft of translation**.

## In Indian Laureates of the International Booker Prize

- **2022:** *Tomb of Sand* by **Geetanjali Shree**, translated by **Daisy Rockwell** (first Hindi-language work to win).
- **2025:** *Heart Lamp* by **Banu Mushtaq**, translated by **Deepa Bhasthi** (first Kannada-language work to win).

### About Banu Mushtaq

- **Date of Birth:** April 3, 1948
- **Hometown:** Hassan, Karnataka
- **Professions:** Writer, lawyer, journalist, social activist, and former municipal councillor.

### Key Associations:

- Part of the **Bandaya Movement**, a progressive literary wave in Kannada challenging societal injustices.

### Writing Journey:

- Debuted in 1974 in the publication *Prajamatha*.
- Worked with *Lankesh Patrike* (1981–1990), under the guidance of writer-editor **P. Lankesh**.
- Later transitioned to practicing law while continuing her focus on themes such as **gender, caste, and religion** in her writing.

## PBAT (Polybutylene Adipate Terephthalate)

### Context

- Kamalpur Nagar Panchayat in Tripura has introduced compostable bags made from **PBAT (Polybutylene**

**Adipate Terephthalate)** to replace single-use plastic. This aligns with India's broader goals to reduce plastic pollution and promote sustainable alternatives.

### What is PBAT?

- **PBAT (Polybutylene Adipate Terephthalate)** is a **biodegradable** and **compostable** thermoplastic polymer.
- Despite being **petroleum-based**, it degrades fully under **industrial composting conditions**.
- **Chemical Structure:** Copolymer of:
  - **Adipic acid**
  - **1,4-butanediol**
  - **Terephthalic acid**
- **Processing:** Compatible with conventional plastic processing techniques; suitable for packaging applications.

### Properties of PBAT

Property	Details
<b>Biodegradability</b>	Decomposes in 180 days in industrial composting (ASTM D6400/EN 13432).
<b>Flexibility</b>	Comparable to LDPE; suitable for making films and bags.
<b>Barrier Properties</b>	Good resistance to moisture and chemicals.
<b>Thermal Stability</b>	Withstands a broad temperature range.
<b>Eco-Safety</b>	Leaves no toxic residue – degrades to CO <sub>2</sub> , water, and biomass.

## Applications of PBAT

- Compostable carry bags
- Agricultural mulch films
- Disposable packaging (wrappers, liners)
- Biomedical waste bags
- Blends with other biopolymers for high-strength applications

## PBAT vs PLA (Polylactic Acid)

Feature	PBAT	PLA (Polylactic Acid)
Source	Fossil-based	Bio-based (corn, sugarcane)
Biodegradability	Fast in industrial composting	Biodegradable but slower
Flexibility	High (LDPE-like)	Brittle, less flexible
Cost	Lower than PLA but still above polyethylene	Higher than PBAT
Applications	Bags, films, liners	Cutlery, containers, electronics packaging
Composting Needs	Industrial composting essential	Degrades in controlled conditions

## Supreme Court's Verdict on Ex-Post-Facto Environmental Clearance

### Context

- In a landmark judgment, the Supreme Court of India invalidated the Union Government's executive orders that

sought to regularise environmental violations by granting *ex-post-facto environmental clearances* to projects that began operations without prior approval.

## Key Dimensions

### Background

- **2017 MoEFCC Notification:** Allowed a six-month window for projects that bypassed prior EC to apply for clearance retrospectively.
- **2021 SOP:** Operationalised the 2017 provision, enabling violators to continue operations through a "standard" route.
- **Legal Challenge:** These were seen as violating the **Environment (Protection) Act, 1986**, and **EIA Notification, 2006**, which mandate *prior* clearance.

### Supreme Court's Key

### Observations

- **Declared 2017 & 2021 Measures Illegal:** Held ultra vires the parent Act.
- **Right to Clean Environment = Article 21:** Reinforced its status as a **fundamental right**.
- **Environmental Damage ≠ Monetary Penalty:** Economic fines cannot substitute prior clearance.
- **Criticism of Executive:** Accused the government of "*going out of its way*" to protect violators.
- **Precedents Cited:** *Common Cause v. Union of India (2017)* — Ex-post-facto approvals unsustainable in law.

## Legal Framework Reaffirmed

Law/Provision	Relevance
<b>Environment (Protection) Act, 1986</b>	Empowers government to enforce environmental safeguards, mandates prior EC
<b>EIA Notification, 2006</b>	Structured assessment process including public consultation and prior approval
<b>Article 21 (Right to Life)</b>	Judicial interpretation includes right to a clean and healthy environment

## Implications of the Judgment

- **Rule of Law Restored:** Limits arbitrary executive powers.
- **Boost to Environmental Governance:** Strengthens role of regulatory bodies.
- **Discouragement of Illegal Practices:** Prevents rewarding of violators.
- **Public Health Emphasised:** Links environmental protection to urban health crises (e.g., Delhi pollution).
- **Judicial Independence:** Courts remain vigilant in upholding statutory and constitutional mandates.

## Critique of Government's Justifications

Justification	Court's Response
<b>Economic Loss</b>	Cannot override environmental laws
<b>Fines as Substitutes</b>	Punitive ≠ Substitutive; fines don't restore environmental balance
<b>Right to Employment</b>	Must be balanced with ecological sustainability

## Lessons for Environmental Policy

- **No Shortcuts:** Prior EC must be non-negotiable.
- **Institutional Strengthening:** SEIAAs and Pollution Control Boards need capacity-building.
- **Codification Needed:** Judicially established norms against post-facto clearance should be legislatively embedded.
- **Sustainable Development:** Economic growth must not undermine long-term ecological well-being.

## Way Forward

- **Enhance Institutional Capacity:** Skilled manpower, technology, and inter-agency coordination.
- **Increase Transparency:** Public access to EIA reports, approvals, and compliance data.
- **Strengthen Public Participation:** Ensure informed and inclusive consultations.
- **Legal Reforms:** Amend EIA Notification to expressly forbid post-facto approvals.
- **Empower Judiciary and Regulators:** Enable enforcement and restoration mechanisms.

## Conclusion

- The Supreme Court's judgment is a decisive **vindication of environmental justice and constitutional morality**. It asserts that **industrial growth cannot come at the expense of ecological integrity**. The verdict is a **clarion call** for India to adopt **sustainable development as a central pillar of policy** — where **law,**

environment, and public interest converge.

## Kerala Oil Spill Incident

### Context

- A Liberian-flagged cargo vessel, **MSC ELSA 3**, sank off the coast of **Kochi**, Kerala, carrying **hazardous materials** and large volumes of **fuel**, sparking fears of a major **oil spill** and its ecological and economic consequences.

### What is an Oil Spill?

- An **accidental release of petroleum products** into marine environments, forming a slick on the water surface. It:
  - Blocks sunlight**, disrupting photosynthesis.
  - Reduces oxygen levels**, harming marine organisms.
  - Persists for years**, especially in enclosed coastal ecosystems.

### Impact of Oil Spills

#### 1. Marine Life Destruction

- Oil coats birds, turtles, and mammals, impairing movement and heat regulation.
- Toxic hydrocarbons impact fish health, reproduction, and food safety.

#### 2. Ecosystem Disruption

- Kills **phytoplankton**, corals, mangroves, and disrupts **marine food chains**.

- Long-lasting damage to **estuaries and coastal habitats**.

#### 3. Economic Losses

- Impacts **fisheries, tourism, and shipping** sectors.
- High **cleanup costs**, compensation issues, and loss of livelihoods.

### Legal and Policy Framework

#### International Conventions

Convention	Objective
<b>MARPOL (1973/78)</b>	Prevent marine pollution from ships; India is a signatory.
<b>OPRC Convention (1990)</b>	Encourages cooperation in oil spill preparedness and response.

#### Indian Legal Provisions

- Merchant Shipping Act, 1958:** Regulates pollution from vessels in Indian waters.
- National Oil Spill Disaster Contingency Plan (NOS-DCP):**
  - Indian Coast Guard** is the nodal authority.
  - Coordinates emergency response, containment, and public safety.

### Oil Spill Management Techniques

Technique	Function
<b>Skimmers</b>	Physically remove oil from the surface.
<b>Dispersants</b>	Break oil into droplets to enhance microbial degradation.
<b>Oil Booms</b>	Contain the spread of oil slicks.

<b>In-situ Burning</b>	Controlled surface burning of oil patches.
<b>Bioremediation</b>	Use of microbes (e.g., TERI's <i>Oil Zapper</i> ) to degrade oil.

<b>Altitude</b>	206 meters above sea level
<b>Microhabitat</b>	Fast-flowing stream, ~60 meters inside the cave
<b>Water Conditions</b>	Temperature ~18°C, low dissolved oxygen — typical of <b>subterranean streams</b>

## Schistura densiclava

### Context

- A new species of cave-dwelling loach, **Schistura densiclava**, has been discovered in the **Krem Mawjymbuin cave**, located in the **East Khasi Hills**, Meghalaya. This discovery adds to India's rich subterranean biodiversity.

### About Schistura densiclava

Feature	Description
<b>Taxonomy</b>	Belongs to the <b>Nemacheilidae</b> family (stone loaches)
<b>Type</b>	<b>Troglophile</b> : can live in both cave (hypogean) and surface (epigean) waters
<b>Pigmentation</b>	Retains <b>pigmentation and functional eyes</b> — unlike most cave species
<b>Scientific Name Meaning</b>	<i>Densiclava</i> = "thick stripe" (Latin), referring to the prominent dorsal stripe

### Habitat Characteristics

Parameter	Details
<b>Location</b>	Krem Mawjymbuin Cave, East Khasi Hills, Meghalaya

### Morphological Features

Feature	Description
<b>Body Color</b>	Pale yellow-green with <b>14–20 vertical black/grey bars</b>
<b>Distinct Stripe</b>	Thick dark stripe near the <b>dorsal fin</b> (namesake feature)
<b>Sexual Dimorphism</b>	Males: Slimmer with irregular patterns & puffer cheeks; Females: Sturdier with consistent bars

### Ecological & Conservation Significance

Point	Insight
<b>Endemism</b>	Restricted to a <b>single cave</b> — high conservation value
<b>Biodiversity Significance</b>	6th cave fish species recorded in Meghalaya, reaffirming its <b>subterranean biodiversity hotspot</b> status
<b>Genetic Analysis</b>	Confirms it is a <b>distinct and previously unrecorded species</b>
<b>Conservation Needs</b>	Protection of cave habitats from pollution, tourism, and mining threats

# Mendel's Peas: The Origin of Genetics

## Historical Background:

- **Gregor Mendel** (1856–1865): Conducted hybridization experiments on **pea plants (*Pisum sativum*)**.
- Studied **7 traits** (e.g., seed shape, pod color) in over **10,000 plants**.
- Presented findings in **1865**, published in **1866**, but largely ignored until **rediscovered in 1900**.
- Found the **3:1 ratio** in F<sub>2</sub> generations, introducing:
  - **Dominant vs. recessive traits**
  - Alleles as versions of a gene

## Relevance :

- **Science and Technology:** Genetics, Genomics, Biotechnology
- **Agriculture:** Scientific advances for crop improvement

## Modern Decoding of Mendel's Traits

### The Problem:

- Despite Mendel's success, 3 of the 7 traits lacked a molecular genetic **explanation** for over 160 years.

### The Breakthrough:

- Researchers **sequenced 697 pea plant genomes**, generating **60 terabases** of DNA (~14 billion pages of text).
- Used **next-generation sequencing** to **map Mendel's traits at the molecular level**.

## Key Genetic Discoveries

### Unresolved Traits Explained:

1. **Pod Color:** DNA deletion upstream of **ChIG** gene → disrupts chlorophyll production → yellow pods.
2. **Pod Shape:** Variations in **MYB** and **CLE-peptide genes** → constricted pod formation.
3. **Flower Position:** Mutation in **CIK-like coreceptor kinase** gene + modifier locus → terminal flower position.

### Other Insights:

- Identified **new allelic variants** (e.g., white flowers turning purple).
- Found **8 genetic groups** within the ***Pisum*** genus (not just 4 species) due to crossbreeding and admixture.
- Mapped **72 agriculturally significant traits** (seed, pod, leaf, flower, root, architecture).

## Implications for Agriculture and Science

### Agricultural Impact:

- Improved **crop yield**, **disease resistance**, and **climate adaptability**.
- Enables **precision breeding** and **trait selection** using genomic tools.

### Scientific Significance:

- Resolves a **century-old gap** in **classical genetics**.
- Merges **historical Mendelian genetics** with **modern genomics**.
- Shows complexity beyond binary dominant-recessive models — hints at **epistasis** and **polygenic traits**.

## Conclusion

- The decoding of Mendel's pea traits after 160 years bridges the gap

between **classical genetics** and **molecular biology**, unlocking new possibilities for **agricultural innovation** and enriching our understanding of **plant inheritance mechanisms**.

## The dawn of autonomous satellites

- Autonomous satellites represent a **paradigm shift in space technology**, moving from passive data collectors to intelligent, AI-enabled systems capable of making decisions in real time.

### Relevance - GS Paper 3 (Science & Tech)

#### Key Technological Advancements:

- **AI at the Edge:** Satellites equipped with onboard computing, allowing them to process data and act without ground intervention.
- **Functions:**
  - **Autonomous Operations** – Docking, debris removal, and inspections.
  - **Self-repair** – Identifying and correcting internal malfunctions.
  - **Orbital Navigation** – Fuel-optimized, hazard-aware route planning.
  - **Crisis Response** – Disaster imaging and coordination.
  - **Combat Roles** – Threat detection and potentially lethal autonomy (raises legal/ethical alarms).
  - **Developers:** Mix of national space agencies and private startups using LLMs and energy-efficient AI.

### Smarter Satellites, Sharper Dangers

#### AI Hallucination & Escalation Risks:

- Faulty threat detection could **trigger unintended military conflict**, especially in contested zones.

#### Legal Grey Zones:

- **Outer Space Treaty (OST), 1967:**
  - Article VI: **States liable for national space activities** — does not clearly address autonomous decisions.
  - Article VII: **Liability for damage** — assumes **human control**.
- **Liability Convention, 1972:**
  - No clarity on accountability when AI is in charge — blurs lines between **developer, operator, and launching state**.

#### Dual-Use Dilemma:

- Same AI satellites can serve **civilian and military** purposes, raising **misinterpretation risks** and diplomatic tension.

### Legal and Technical Solutions Proposed

#### Legal Reforms:

- **Autonomy Grading System:** As with autonomous vehicles — higher autonomy demands stricter oversight.
- **Human Oversight Mandate:** Advocated by IISL (2024) to ensure human-in-the-loop control.
- **Global Certification:** Through **COPUOS, ISO**, and others to standardize safety, ethics, and accountability.

### Testing Standards:

- Collision simulations
- Sensor error resilience
- Decision-logging systems for post-event audits

### Legal Analogies:

- HNS Convention (1996) and Montreal Convention (1999):
  - Use of **strict liability + pooled insurance** could guide future space law.

## Ethical & Geopolitical Imperatives

### Weaponization of Space AI:

- Under scrutiny in forums like:
  - Convention on Certain Conventional Weapons (CCW)
  - GGE on Lethal Autonomous Weapon Systems (LAWS)

### Data Ethics & Surveillance:

- Satellites can collect sensitive information — raises **privacy** and **data governance** concerns.

### Peace & Stability Risk:

- Accidental engagements due to faulty AI could **destabilize geopolitical balances**.

## The Way Forward: Shared Orbits, Shared Responsibilities

### Urgent Challenges:

- By **2030**, thousands of AI satellites in Low Earth Orbit (LEO) — increasing risk of **collision, chaos, and conflicts**.

### Historical Parallel:

- Like **railways, cars, and the internet**, autonomous satellites demand a **new legal regime**.

### Balance Needed:

- **Innovation vs. Precaution**
- **Sovereignty vs. Global Stewardship**

### Conclusion

- The rise of autonomous satellites marks a turning point in space exploration and warfare. As AI systems assume increasing control, **global cooperation and updated legal frameworks** are critical to prevent an arms race, ensure accountability, and uphold peace in outer space.

## Conservation of Dugongs Must Remain a Top Priority for India

### Context

- The **dugong (Dugong dugon)**, also known as the “**sea cow**”, is India’s only herbivorous marine mammal. Its population is declining due to multiple anthropogenic threats, making its conservation an urgent ecological priority.

### Relevance:

- **GS Paper 3:** Environment, Conservation, Biodiversity, Climate Change

### The Dugong:

- **Habitat:** Shallow tropical marine waters, rich in **seagrass meadows**.

- **Distribution (India):**
  - Andaman & Nicobar Islands
  - Gulf of Mannar
  - Palk Bay
  - Gulf of Kutch
- **Ecological Role:**
  - Known as the “farmer of the sea” — helps maintain healthy seagrass ecosystems.
- **Reproduction & Longevity:**
  - Matures at 9–10 years, lives up to 70 years, with low reproduction rate (~3–5 years).







- **MoU on Dugong Conservation (2008)** under CMS

### Key Initiatives

#### Dugong Conservation Reserve (2022) – Tamil Nadu

- **Area:** 448.3 sq. km (Palk Bay)
- **Seagrass Coverage:** 122.5 sq. km intact
- **Institutional Support:**
  - OMCAR Foundation
  - Wildlife Institute of India
  - Tamil Nadu Forest Department

### Threats to Dugongs

Type	Details
 <b>Habitat Loss</b>	Due to ports, tourism, agriculture, and urban expansion.
 <b>Pollution</b>	Mercury, organochlorines in tissues indicate toxic exposure.
 <b>Fishing Threats</b>	Accidental bycatch in gillnets, mechanized trawling.
 <b>Climate Change</b>	Sea warming, acidification, cyclones degrade seagrass.
 <b>Illegal Hunting</b>	Despite Schedule I status, poaching still occurs.
 <b>Boat Collisions</b>	Dugongs surface frequently, making them vulnerable.

### Way Forward:

#### Conservation Strategies

- **Seagrass Mapping & Monitoring**
- **Fishing Reforms:** Ban on bottom trawling, gillnets in key habitats
- **Community Stewardship:** Engage fishers in protection, eco-tourism
- **Awareness & Training:** Fisher education, village campaigns
- **Rescue & Reporting Networks:** Local rapid-response mechanisms

#### Research & Innovation

- **Satellite/Drones:** Tracking movements
- **Tagging & Monitoring:** Population dynamics
- **Citizen Science & TEK:** Use traditional knowledge for sightings

#### Seagrass Ecosystems: The Dugong’s Lifeline

- **What is Seagrass?**
  - Flowering underwater plant (not algae), forms **marine wetlands**.
- **Ecological Importance:**
  - Stabilizes seafloor
  - Supports marine biodiversity

### Conservation Status

- **IUCN Red List:** *Vulnerable* globally
- **India:** *Regionally Endangered*
- **Legal Protection:**
  - Schedule I of **Wildlife (Protection) Act, 1972**
  - **CMS Convention (1983)**

- **Carbon Sink:** Sequestration up to **434.9 tonnes CO<sub>2</sub>/km<sup>2</sup>/year**

### India's Seagrass Status (2022):

- **Total Area:** 516.59 sq. km
- **Key Hotspots:**
  - Gulf of Mannar & Palk Bay (13+ species, Indian Ocean's richest)
  - A&N Islands, Kachchh Coast, Lakshadweep (patchy but vital)
  - Andhra Pradesh & Odisha (sparse; unsuitable for dugongs)

### Conclusion

- Dugongs are keystone marine species, and their protection reflects the health of India's coastal and seagrass ecosystems. Conservation must combine legal enforcement, ecological monitoring, community involvement, and climate adaptation strategies.

## WMO Report: Global Warming Set to Breach 1.5°C Limit (2025–2029)

### Context:

- The **World Meteorological Organization (WMO)**, in its report released on **May 28, 2025**, warns that the **average global temperature between 2025 and 2029 is 70% likely to exceed the 1.5°C limit** above pre-industrial levels (1850–1900 baseline).

### UPSC Relevance:

- **GS Paper III – Environment:**

### Key Findings:

- **70% probability:** Global average temperature (2025–2029) will cross **5°C threshold**.
- **86% chance:** At least **one year** during 2025–29 will exceed **5°C warming**.
- **80% chance:** One of these years will be **warmer than 2024**, the hottest year recorded.
- **Annual mean surface temperature range (2025–2029):** Between **2°C and 1.9°C** above pre-industrial levels.

### Significance of the 1.5°C Threshold:

- **Established under:** Paris Climate Agreement (COP21, 2015)
- Aim: Limit global warming to **below 2°C**, preferably to **5°C**, to **prevent irreversible climate impacts**.
- A **permanent breach** implies sustained warming for **20–30 years**, triggering extreme weather, sea-level rise, and ecological collapse.
- **Countries must submit updated Nationally Determined Contributions (NDCs)** for **2031–2035** to the **UNFCCC** this year.

### Climate Change Impacts:

- **Last decade was the warmest on record.**
- **Climate change threatens:**
  - 🌿 Ecosystems
  - 🌾 Agriculture and Food Security
  - 🚑 Public Health
  - 💰 Economies and Livelihoods

## Regional Climate & Monsoon Outlook (2025–2029):

1. **South Asia (incl. India):**
  - **Trend:** Wetter than usual in recent years (except 2023)
  - **IMD:**
    - **4 out of last 5 years** had **above-normal monsoons**
    - **2025 monsoon** also predicted to be **above-normal**
  - **WMO caution:** Occasional dry spells possible
2. **Arctic Region:**
  - Expected warming of **4°C** (Nov–Mar), **3.5x** faster than global average
  - **Sea ice decline:** Barents Sea, Bering Sea, Sea of Okhotsk

### Other Regional Trends:

Region	Forecasted Climate Trend
Sahel, N. Europe, Alaska, N. Siberia	Above-normal rainfall
Amazon Basin	Drier than usual

### Way Forward:

- **Strengthen NDCs** and align them with 1.5°C goal
- Accelerate **clean energy transition**
- Improve **climate-resilient infrastructure**
- Support **climate finance and technology transfer** to developing nations
- Enhance **early warning systems** and **adaptation strategies**

## Autonomous Warfare in Operation Sindoor

### Context:

- India's first full-scale drone-led military operation post-Pahalgam terror attack, May 2025

### Relevance:

- **GS Paper III – Security / Defence Technology**

### Background:

- **Operation Sindoor** was launched in **May 2025** in retaliation for the **April 22 Pahalgam terror attack**.
- Marked **South Asia's first instance of full-spectrum autonomous drone warfare** between two nuclear-armed states (India & Pakistan).
- Characterized by **below-threshold conflict** using **drones, loitering munitions, and autonomous aerial platforms**.

### Indian Drone Warfare Capabilities: Intelligence, Surveillance, and Reconnaissance (ISR):

- **Israeli Heron MK-II** and **Indian TAPAS-BH-201 (Rustom-II)** UAVs for pre-strike recon.
- Detected **thermal signatures**, signal intel from terror camps across the border.

### Aerial Systems Deployed:

Category	Systems Used
<b>Loitering Munitions</b>	<b>Nagashtra-1</b> (Indigenous), <b>Harop</b> (Israeli-origin)

<b>Swarm Drones</b>	DRDO + Private Sector Collaboration (Radar saturation)
<b>ISR Platforms</b>	Heron MK-II, TAPAS-BH-201/Rustom-II
<b>Tactical Systems</b>	Quadcopters, Micro-UAVs integrated with <b>IBMS</b>

### Strike Strategy:

- **Phase 1:** Electronic warfare drones + decoys to provoke and exhaust air defences.
- **Phase 2:** Followed by **armed UAVs** and **loitering munitions** for precision strikes.
- **Highlight:** Harop drone destroyed **Chinese HQ-9 SAM near Lahore**; created panic during a **cricket match** in Rawalpindi.

### Pakistan's Response: Operation Bunyan-um-Marsoos ("Wall of Lead")

Category	Systems Used
<b>ISR Drones</b>	Shahpar-II, Bayraktar TB2, Wing Loong II
<b>Armed UAVs</b>	Burraq, CH-4
<b>Loitering Munitions</b>	CH-901, WS-43 (Chinese-origin), indigenous kamikaze drones

- Attack span: **Kashmir to Bhuj (1,500 km)**
- Focused on Indian **radars, forward bases, and IAF command centers**
- **Outcome:** Indian **air defence systems neutralised most attacks**, minimal damage

### India's Multi-Layered Air Defence System:

#### Command & Control:

- **IACCS:** Integrates radar, AWACS, satellite data for rapid, resilient response
- Used **Directed Energy Weapons (DEWs)** — lasers/microwaves

#### Tactical & Ground-Level:

- **Akashteer System:** Coordinates Army Air Defence (AAD) sensor-to-shooter operations
- **LLAD Systems:** Pechora, OSA-AK, ZSU-23-4 Shilka, Bofors L/70, etc.
- **Sniper teams** integrated with BSF for low-altitude drone threats

### Missile Defence Arsenal:

System	Role
<b>SPYDER</b>	Point defence (Python-5, Derby)
<b>Akash / Akash-NG</b>	Medium-range SAM
<b>Barak-8</b>	Indo-Israeli long-range SAM
<b>S-400 'Triumpf'</b>	Strategic SAM from Russia (3/5 units delivered)

#### Strategic Implications:

- **New Model of Deterrence:** Low-cost, algorithm-driven, autonomous combat
- **No Manpower Risk:** First large-scale operation using unmanned platforms
- **Changing Warfare Doctrine:**
  - War no longer starts with troop mobilization.
  - Begins with **pre-programmed aerial drone incursions**
  - Emphasis on **AI, ISR, EW, and real-time data integration**

### Conclusion:

- **Operation Sindoor** is a **watershed moment** in India's defence history. It highlights the **future of combat** — one that is **remote, autonomous, precise,** and **strategically disruptive**.

## Prelims Practice Questions

**1. "Sedition has become my religion" was the famous statement given by Gandhiji at the time of**

- The Champaran Satyagraha
- Publicly violating Salt Law at Dandi
- Attending the Second Round Table Conference in London
- The launch of the Quit India Movement

**2. The famous female figurine known as 'Dancing Girl', found at Mohenjo-daro, is made of**

- carnelian
- clay
- bronze
- gold

**3. Who provided legal defence to the people arrested in the aftermath of Chauri Chaura incident?**

- C. R. Das
- Madan Mohan Malaviya
- Dr. Saifuddin Kitchlew and Khwaja Hasan Nizami
- M. A. Jinnah

**4. Subsequent to which one of the following events, Gandhiji, who consistently opposed untouchability and appealed for its eradication from all spheres, decided to include the upliftment of 'Harijans' in his political and social programme?**

- The Poona Pact
- The Gandhi-Irwin (Delhi Pact)

- Arrest of Congress leadership at the time of the Quit India Movement
- Promulgation of the Government of India Act, 1935

**5. Consider the following fruits:**

- Papaya
- Pineapple
- Guava

How many of the above were introduced in India by the Portuguese in the sixteenth and seventeenth centuries?

- Only one
- Only two
- All the three
- None

**6. Consider the following countries:**

- United Kingdom
- Denmark
- New Zealand
- Australia
- Brazil

How many of the above countries have more than four time zones?

- All the five
- Only four
- Only three
- Only two

**7. Consider the following statements:**

- Anadyr in Siberia and Nome in Alaska are a few kilometers from each other, but when people are waking up and getting set for breakfast in these cities, it would be different days.
- When it is Monday in Anadyr, it is Tuesday in Nome.

Which of the statements given above is/are correct?

- I only
- II only
- Both I and II
- Neither I nor II

**8. Who among the following was the founder of the Self-Respect Movement?**

- a) Periyar E. V. Ramaswamy Naicker
- b) Dr. B. R. Ambedkar
- c) Bhaskarrao Jadhav
- d) Dinkarrao Javalkar

**9. Consider the following pairs:**

Country	Resource-rich in
1. Botswana	Diamond
2. Chile	Lithium
3. Indonesia	Nickel

How many of the above rows is the given information correctly matched?

- a) Only one
- b) Only two
- c) All the three
- d) None

**10. Consider the following pairs:**

Region	Country
1. Mallorca	Italy
2. Normandy	Spain
3. Sardinia	France

How many of the above rows is the given information correctly matched?

- a) Only one
- b) Only two
- c) All the three
- d) None

**11. Suppose the revenue expenditure is ₹80,000 crores and the revenue receipts of the Government are ₹60,000 crores. The Government budget also shows borrowings of ₹10,000 crores and interest payments of ₹6,000 crores.**

Which of the following statements are correct?

- I. Revenue deficit is ₹20,000 crores.
- II. Fiscal deficit is ₹10,000 crores.
- III. Primary deficit is ₹4,000 crores.

Select the correct answer using the code given below:

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**12. India is one of the founding members of the International North-South Transport Corridor (INSTC), a multimodal transportation corridor, which will connect**

- a) India to Central Asia to Europe via Iran
- b) India to Central Asia via China
- c) India to South-East Asia through Bangladesh and Myanmar
- d) India to Europe through Azerbaijan

**13. Consider the following statements:**

Statement I: Of the two major ethanol producers in the world, i.e., Brazil and the United States of America, the former produces more ethanol than the latter.

Statement II: Unlike in the United States of America where corn is the principal feedstock for ethanol production, sugarcane is the principal feedstock for ethanol production in Brazil.

Which one of the following is correct in respect of the above statements?

- a) Both Statement I and Statement II are correct and Statement II explains Statement I
- b) Both Statement I and Statement II are correct but Statement II does not explain Statement I
- c) Statement I is correct but Statement II is not correct
- d) Statement I is not correct but Statement II is correct

**14. The World Bank warned that India could become one of the first places where wet-bulb temperatures routinely exceed 35 °C.**

**Which of the following statements best reflect(s) the implication of the above-said report?**

- I. Peninsular India will most likely suffer from flooding, tropical cyclones and droughts.
- II. The survival of animals including humans will be affected as shedding of their body heat through perspiration becomes difficult.

Select the correct answer using the code given below:

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**15. A country's fiscal deficit stands at ₹50,000 crores. It is receiving ₹10,000 crores through non-debt creating capital receipts. The country's interest liabilities are ₹1,500 crores. What is the gross primary deficit?**

- a) ₹48,500 crores
- b) ₹51,500 crores
- c) ₹58,500 crores
- d) None of the above

**16. Which of the following statements with regard to recommendations of the 15th Finance Commission of India is/are correct?**

- I. It has recommended ₹4,800 crores from the year 2022–23 to the year 2025–26 for incentivizing States to enhance educational outcomes.
- II. 45% of the net proceeds of Union taxes are to be shared with States.
- III. ₹45,000 crores are to be kept as performance-based incentive for all States for carrying out agricultural reforms.

IV. It reintroduced tax effort criteria to reward fiscal performance.

Select the correct answer using the code given below:

- a) I, II and III
- b) I, II and IV
- c) I, III and IV
- d) II, III and IV

**17. Consider the following statements in respect of the International Bank for Reconstruction and Development (IBRD):**

- I. It provides loans and guarantees to middle income countries.
- II. It works single-handedly to help developing countries' to reduce poverty.
- III. It was established to help Europe rebuild after the World War II.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and II only
- d) I, II and III

**18. Consider the following statements in respect of RTGS and NEFT:**

- I. In case of RTGS, the settlement time is instantaneous while in NEFT, it takes some time to settle payments.
- II. In RTGS, the customer is charged for inward transactions while that is not the case for NEFT.
- III. Operating hours for RTGS are restricted on certain days while this is not true for NEFT.

Which of the statements given above is/are correct?

- a) I only
- b) I and II only
- c) I and III
- d) III only

**19. Consider the following countries:**

1. United Arab Emirates
2. France
3. Germany
4. Singapore
5. Bangladesh

How many countries amongst the above are there other than India where international merchant payments accepted under UPI?

- a) Only two
- b) Only three
- c) Only four
- d) All the five

**20. Consider the following statements about 'PM Surya Ghar Muft Bijli Yojana':**

- I. It targets installation of one crore solar rooftop panels in the residential sector.
- II. The Ministry of New and Renewable Energy aims to impart training on installation, operation, maintenance and repairs of solar rooftop systems at grassroots levels.
- III. It aims to create more than three lakhs skilled manpower through fresh skilling, and upskilling, under scheme component of capacity building.

Which of the statements given above are correct?

- a) I and II only
- b) I and III only
- c) II and III only
- d) I, II and III

**21. Consider the following statements:**

Statement I: Some rare earth elements are used in the manufacture of flat television screens and computer monitors.

Statement II: Some rare earth elements have phosphorescent properties.

Which one of the following is correct in respect of the above statements?

- a) Both Statement I and Statement II are correct and Statement II explains Statement I

- b) Both Statement I and Statement II are correct but Statement II does not explain Statement I
- c) Statement I is correct but Statement II is not correct
- d) Statement I is not correct but Statement II is correct

**22. Consider the following statements:**

- I. Indian Railways have prepared a National Rail Plan (NRP) to create a 'future ready' railway system by 2028.
- II. 'Kavach' is an Automatic Train Protection system developed in collaboration with Germany.
- III. 'Kavach' system consists of RFID tags fitted on track in station section.

Which of the statements given above are not correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**23. Consider the following space missions:**

- I. Axiom-4
- II. SpaDeX
- III. Gaganyaan

How many of the space missions given above encourage and support microgravity research?

- a) Only one
- b) Only two
- c) All the three
- d) None

**24. With reference to India's defence, consider the following pairs:**

Aircraft Type	Description
Dornier-228	Maritime patrol aircraft
IL-76	Supersonic combat aircraft
C-17 Globemaster III	Military transport aircraft

How many of the pairs given above are correctly matched?

- a) Only one
- b) Only two
- c) All the three
- d) None

**25. Artificial way of causing rainfall to reduce air pollution makes use of**

- a) Silver iodide and potassium iodide
- b) Silver nitrate and potassium iodide
- c) Silver iodide and potassium nitrate
- d) Silver nitrate and potassium chloride

**26. Consider the following statements with regard to pardoning power of the President of India:**

- I. The exercise of this power by the President can be subjected to limited judicial review.
- II. The President can exercise this power without the advice of the Central Government.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**27. Consider the following statements:**

- I. On the dissolution of the House of the People, the Speaker shall not vacate his/her office until immediately before the first meeting of the House of the People after the dissolution.
- II. According to the provisions of the Constitution of India, a Member of the House of the People on being elected as Speaker shall resign from his/her political party immediately.
- III. The Speaker of the House of the People may be removed from his/her office by a resolution of the House of the People passed by a majority of all the then Members of the House, provided that no

resolution shall be moved unless at least fourteen days' notice has been given of the intention to move the resolution.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**28. Consider the following statements:**

- I. If any question arises as to whether a Member of the House of the People has become subject to disqualification under the 10th Schedule, the President's decision in accordance with the opinion of the Council of Union Ministers shall be final.
- II. There is no mention of the word 'political party' in the Constitution of India.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**29. Consider the following statements:**

- I. Statement I: In India, State Governments have no power for making rules for grant of concessions in respect of extraction of minor minerals even though such minerals are located in their territories.
- II. Statement II: In India, the Central Government has the power to notify minor minerals under the relevant law.

Which one of the following is correct in respect of the above statements?

- a) Both Statement I and Statement II are correct and Statement II explains Statement I
- b) Both Statement I and Statement II are correct but Statement II does not explain Statement I
- c) Statement I is correct but Statement II is not correct

- d) Statement I is not correct but Statement II is correct

**30. Which organization has enacted the Nature Restoration Law (NRL) to tackle climate change and biodiversity loss?**

- a) The European Union  
 b) The World Bank  
 c) The Organization for Economic Cooperation and Development  
 d) The Food and Agriculture Organization

**31. With reference to the Indian polity, consider the following statements:**

- I. An Ordinance can amend any Central Act.  
 II. An Ordinance can abridge a Fundamental Right.  
 III. An Ordinance can come into effect from a back date.

Which of the statements given above are correct?

- a) I and II only  
 b) II and III only  
 c) I and III only  
 d) I, II and III

**32. Consider the following pairs:**

State	Description
<b>Arunachal Pradesh</b>	The capital is named after a fort, and the State has two National Parks
<b>Nagaland</b>	The State came into existence on the basis of a Constitutional Amendment
<b>Tripura</b>	Initially a Part 'C' State, it became a centrally administered territory with the reorganization of States in 1956 and later attained the status of a full-fledged State

How many of the above pairs are correctly matched?

- a) Only one  
 b) Only two  
 c) All the three  
 d) None

**33. With reference to India, consider the following:**

- I. The Inter-State Council  
 II. The National Security Council  
 III. Zonal Councils

How many of the above were established as per the provisions of the Constitution of India?

- a) Only one  
 b) Only two  
 c) All the three  
 d) None

**34. Consider the following statements:**

- I. The Constitution of India explicitly mentions that in certain spheres the Governor of a State acts in his/her own discretion.  
 II. The President of India can, of his/her own, reserve a bill passed by a State Legislature for his/her consideration without it being forwarded by the Governor of the State concerned.

Which of the statements given above is/are correct?

- a) I only  
 b) II only  
 c) Both I and II  
 d) Neither I nor II

**35. Consider the following pairs:**

Provision in the Constitution of India	Stated under
I. Separation of Judiciary from the Executive in the public services of the State	The Directive Principles of State Policy
II. Valuing and preserving of the rich heritage of our composite culture	The Fundamental Duties
III. Prohibition of employment of children below the	The Fundamental Rights

age of 14 years in factories	
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How many of the above pairs are correctly matched?

- a) Only one
- b) Only two
- c) All the three
- d) None

**36. Consider the following statements:**

With reference to the Constitution of India, if an area in a State is declared as Scheduled Area under the Fifth Schedule

- I. The State Government loses its executive power in such areas and a local body assumes total administration.
- II. The Union Government can take over the total administration of such areas under certain circumstances on the recommendations of the Governor.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**37. With reference to India, consider the following pairs:**

Organization	Union Ministry
I. The National Automotive Board	Ministry of Commerce and Industry
II. The Coir Board	Ministry of Heavy Industries
III. The National Centre for Trade Information	Ministry of Micro, Small and Medium Enterprises

How many of the above pairs are correctly matched?

- a) Only one
- b) Only two
- c) All the three
- d) None

**38. Consider the following subjects under the Constitution of India:**

- I. List I – Union List, in the Seventh Schedule
  - II. Extent of the executive power of a State
  - III. Conditions of the Governor’s office
- For a constitutional amendment with respect to which of the above, ratification by the Legislatures of not less than one-half of the States is required before presenting the Bill to the President of India for assent?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**39. With reference to the Indian polity, consider the following statements:**

- I. The Governor of a State is not answerable to any court for the exercise and performance of the powers and duties of his/her office.
- II. No criminal proceedings shall be instituted or continued against the Governor during his/her term of office.
- III. Members of a State Legislature are not liable to any proceedings in any court in respect of anything said within the House.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**40. Consider the following activities:**

- I. Production of crude oil
- II. Refining, storage and distribution of petroleum
- III. Marketing and sale of petroleum products
- IV. Production of natural gas

How many of the above activities are regulated by the Petroleum and Natural Gas Regulatory Board in our country?

- a) Only one
- b) Only two
- c) Only three
- d) All the four

**41. Consider the following statements:**

- I. Panchayats at the intermediate level exist in all States.
- II. To be eligible to be a Member of a Panchayat at the intermediate level, a person should attain the age of thirty years.
- III. The Chief Minister of a State constitutes a commission to review the financial position of Panchayats at the intermediate levels and to make recommendations regarding the distribution of net proceeds of taxes and duties, leviable by the State, between the State and Panchayats at the intermediate level.

Which of the statements given above are not correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**42. Consider the following statements in respect of BIMSTEC:**

- I. It is a regional organization consisting of seven member States till January 2025.
- II. It came into existence with the signing of the Dhaka Declaration, 1999.
- III. Bangladesh, India, Sri Lanka, Thailand and Nepal are founding member States of BIMSTEC.
- IV. In BIMSTEC, the subsector of 'tourism' is being led by India.

Which of the statements given above is/are correct?

- a) I and II
- b) II and III
- c) I and IV
- d) I only

**43. Who amongst the following are members of the Jury to select the recipient of 'Gandhi Peace Prize'?**

- I. The President of India
- II. The Prime Minister of India
- III. The Chief Justice of India
- IV. The Leader of Opposition in the Lok Sabha

Select the correct answer using the code given below:

- a) II and IV only
- b) I, II and III
- c) II, III and IV
- d) I and III only

**44. GPS-Aided Geo Augmented Navigation (GAGAN) uses a system of ground stations to provide necessary augmentation. Which of the following statements is/are correct in respect of GAGAN?**

- I. It is designed to provide additional accuracy and integrity.
- II. It will allow more uniform and high-quality air traffic management.
- III. It will provide benefits only in aviation but not in other modes of transportation.

Select the correct answer using the code given below:

- a) I, II and III
- b) II and III only
- c) I only
- d) I and II only

**45. Consider the following statements regarding AI Action Summit held in Grand Palais, Paris in February 2025:**

- I. Co-chaired with India, the event builds on the advances made at the Bletchley Park Summit held in 2023 and the Seoul Summit held in 2024.
- II. Along with other countries, US and UK also signed the declaration on inclusive and sustainable AI.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**46. Consider the following pairs:**

International Year	Declared Year
I. Woman Farmer	2026
II. Sustainable and Resilient Tourism	2027
III. Peace and Trust	2025
IV. Asteroid Awareness and Planetary Defence	2029

How many of the pairs given above are correctly matched?

- a) Only one
- b) Only two
- c) Only three
- d) All the four

**47. Consider the following statements with regard to BRICS:**

- I. 16th BRICS Summit was held under the Chairship of Russia in Kazan.
- II. Indonesia has become full member of BRICS.
- III. The theme of the 16th BRICS Summit was 'Strengthening Multiculturalism for Just Global Development and Security'.

Which of the statements given above is/are correct?

- a) I and II
- b) II and III
- c) I and III
- d) I only

**48. Consider the following statements about Lokpal:**

- I. The power of Lokpal applies to public servants of India, but not to the Indian public servants posted outside India.
- II. The Chairperson or a Member shall not be a Member of the Parliament or a Member of the Legislature of any State

or Union Territory, and only the Chief Justice of India, whether incumbent or retired, has to be its Chairperson.

- III. The Chairperson or a Member shall not be a person of less than forty-five years of age on the date of assuming office as the Chairperson or Member, as the case may be.

- IV. Lokpal cannot inquire into the allegations of corruption against a sitting Prime Minister of India.

Which of the statements given above is/are correct?

- a) III only
- b) II and III
- c) I and IV
- d) None of the above statements is correct

**49. Consider the following statements in respect of the first Kho Kho World Cup:**

- I. The event was held in Delhi, India.
- II. Indian men beat Nepal with a score of 78–40 in the final to become the World Champion in men category.
- III. Indian women beat Nepal with a score of 54–36 in the final to become the World Champion in Women category.

Which of the statements given above is/are correct?

- a) I only
- b) II and III only
- c) I and III only
- d) I, II and III

**50. Consider the following statements:**

- I. In the finals of the 45th Chess Olympiad held in 2024, Gukesh Dommaraju became the world's youngest winner after defeating the Russian player Ian Nepomniachtchi.
- II. Abhimanyu Mishra, an American chess player, holds the record of becoming world's youngest ever Grandmaster.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**51. With reference to investments, consider the following:**

- I. Bonds
- II. Hedge Funds
- III. Stocks
- IV. Venture Capital

How many of the above are treated as Alternative Investment Funds?

- a) Only one
- b) Only two
- c) Only three
- d) All the four

**52. Which of the following are the sources of income for the Reserve Bank of India?**

- I. Buying and selling Government bonds
- II. Buying and selling foreign currency
- III. Pension fund management
- IV. Lending to private companies
- V. Printing and distributing currency notes

Select the correct answer using the code given below:

- a) I and II only
- b) II, III and IV
- c) I, III, IV and V
- d) I, II and V

**53. With reference to the Government of India, consider the following information:**

	Organization	Some of its functions	It works under
I.	Directorate of Enforcement	Enforcement of the Fugitive Economic Offenders Act, 2018	Internal Security Division-I, Ministry

			of Home Affairs
II.	Directorate of Revenue Intelligence	Enforces the provisions of the Customs Act, 1962	Department of Revenue, Ministry of Finance
III.	Directorate General of Systems and Data Management	Carrying out big data analytics to assist tax officers for better policy and nabbing tax evaders	Department of Revenue, Ministry of Finance

In how many of the above rows is the information correctly matched?

- a) Only one
- b) Only two
- c) All the three
- d) None

**54. Consider the following statements:**

- I. The Reserve Bank of India mandates all the listed companies in India to submit a Business Responsibility and Sustainability Report (BRSR).
- II. In India, a company submitting a BRSR makes disclosures in the report that are largely non-financial in nature.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**55. Consider the following statements:**

Statement I: In India, income from allied agricultural activities like poultry farming and wool rearing in rural areas is exempted from any tax.

Statement II: In India, rural agricultural land is not considered a capital asset under the provisions of the Income-tax Act, 1961.

Which one of the following is correct in respect of the above statements?

- a) Both Statement I and Statement II are correct and Statement II explains Statement I
- b) Both Statement I and Statement II are correct but Statement II does not explain Statement I
- c) Statement I is correct but Statement II is not correct
- d) Statement I is not correct but Statement II is correct

**56. Consider the following statements:**

- I. India has joined the Minerals Security Partnership as a member.
- II. India is a resource-rich country in all the 30 critical minerals that it has identified.
- III. The Parliament in 2023 has amended the Mines and Minerals (Development and Regulation) Act, 1957 empowering the Central Government to exclusively auction mining lease and composite license for certain critical minerals.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**57. Consider the following statements:**

Statement I: As regards returns from an investment in a company, generally, bondholders are considered to be relatively at lower risk than stockholders.

Statement II: Bondholders are lenders to a company whereas stockholders are its owners.

Statement III: For repayment purpose, bondholders are prioritized over stockholders by a company.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement I and Statement II are correct and Statement I explains Statement II
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**58. Consider the following statements:**

- I. India accounts for a very large portion of all equity option contracts traded globally thus exhibiting a great boom.
- II. India's stock market has grown rapidly in the recent past even overtaking Hong Kong's at some point of time.
- III. There is no regulatory body either to warn the small investors about the risks of options trading or to act on unregistered financial advisors in this regard.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**59. Consider the following statements:**

Statement I: Circular economy reduces the emission of greenhouse gasses.

Statement II: Circular economy reduces the use of raw materials as inputs.

Statement III: Circular economy reduces wastage in the production process.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I

- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**60. Consider the following statements:**

- I. Capital receipts create a liability or cause a reduction in the assets of the Government.
- II. Borrowings and disinvestment are capital receipts.
- III. Interest received on loans creates a liability of the Government.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**61. Consider the following countries:**

- I. Sweden
- II. Bulgaria
- III. Croatia
- IV. Serbia
- V. Austria
- VI. North Macedonia

How many of the above are members of the North Atlantic Treaty Organization?

- a) Only three
- b) Only four
- c) Only five
- d) All the six

**62. Consider the following countries:**

- I. Bolivia
- II. Brazil
- III. Colombia
- IV. Ecuador
- V. Paraguay
- VI. Venezuela

Andes mountains pass through how many of the above countries?

- a) Only two
- b) Only three
- c) Only four
- d) Only five

**63. Consider the following water bodies:**

- I. Lake Tanganyika
- II. Lake Tonlé Sap
- III. Patos Lagoon

Through how many of them does the equator pass?

- a) Only one
- b) Only two
- c) All the three
- d) None

**64. Consider the following statements**

**about turmeric during the year 2022–23:**

- I. India is the largest producer and exporter of turmeric in the world.
- II. More than 30 varieties of turmeric are grown in India.
- III. Maharashtra, Telangana, Karnataka and Tamil Nadu are major turmeric producing States in India.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**65. Which of the following are the evidences of the phenomenon of continental drift?**

- I. The belt of ancient rocks from Brazil coast matches with those from Western Africa.
- II. The gold deposits of Ghana are derived from the Brazil plateau when the two continents lay side by side.
- III. The Gondwana system of sediments from India is known to have its counterparts in different landmasses of the Southern Hemisphere.

Select the correct answer using the code given below:

- a) I and III only
- b) I and II only
- c) I, II and III
- d) II and III only

**66. Consider the following statements:**

Statement I: The amount of dust particles in the atmosphere is more in subtropical and temperate areas than in equatorial and polar regions.

Statement II: Subtropical and temperate areas have less dry winds.

Which one of the following is correct in respect of the above statements?

- a) Both Statement I and Statement II are correct and Statement II explains Statement I
- b) Both Statement I and Statement II are correct but Statement II does not explain Statement I
- c) Statement I is correct but Statement II is not correct
- d) Statement I is not correct but Statement II is correct

**67. Consider the following statements:**

Statement I: In January, in the Northern Hemisphere, the isotherms bend equatorward while crossing the landmasses, and poleward while crossing the oceans.

Statement II: In January, the air over the oceans is warmer than that over the landmasses in the Northern Hemisphere.

Which one of the following is correct in respect of the above statements?

- a) Both Statement I and Statement II are correct and Statement II explains Statement I
- b) Both Statement I and Statement II are correct but Statement II does not explain Statement I
- c) Statement I is correct but Statement II is not correct
- d) Statement I is not correct but Statement II is correct

**68. Consider the following statements:**

Statement I: In the context of effect of water on rocks, chalk is known as a very permeable rock whereas clay is known as quite an impermeable or least permeable rock.

Statement II: Chalk is porous and hence can absorb water.

Statement III: Clay is not at all porous.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**69. Consider the following statements:**

I. Without the atmosphere, temperature would be well below freezing point everywhere on the Earth's surface.

II. Heat absorbed and trapped by the atmosphere maintains our planet's average temperature.

III. Atmosphere's gases, like carbon dioxide, are particularly good at absorbing and trapping radiation.

Which of the statements given above are correct?

- a) I and III only
- b) I and II only
- c) I, II and III
- d) II and III only

**70. Consider the following statements about the Rashtriya Gokul Mission:**

- I. It is important for the upliftment of rural poor as majority of low producing indigenous animals are with small and marginal farmers and landless labourers.
- II. It was initiated to promote indigenous cattle and buffalo rearing and

conservation in scientific and holistic manner.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**71. Consider the following statements about Raja Rammohan Roy:**

- I. He possessed great love and respect for the traditional philosophical systems of the East.
- II. He desired his countrymen to accept the rational and scientific approach and the principle of human dignity and social equality of all men and women.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**72. Consider the following subjects with regard to Non-Cooperation Programme:**

- I. Boycott of law-courts and foreign cloth
- II. Observance of strict non-violence
- III. Retention of titles and honours without using them in public
- IV. Establishment of Panchayats for settling disputes

How many of the above were parts of Non-Cooperation Programme?

- a) Only one
- b) Only two
- c) Only three
- d) All the four

**73. The irrigation device called 'Araghatta' was**

- a) a water bag made of leather pulled over a pulley

- b) a large wheel with earthen pots tied to the outer ends of its spokes
- c) a larger earthen pot driven by bullocks
- d) a large water bucket pulled up by rope directly by hand

**74. Who among the following rulers in ancient India had assumed the titles 'Mattavilasa' , 'Vichitrachitta' and 'Gunabhara'?**

- a) Mahendravarman I
- b) Simhavishnu
- c) Narasimhavarman I
- d) Simhavarman

**75. Fa-hien (Faxian), the Chinese pilgrim, travelled to India during the reign of**

- a) Samudragupta
- b) Chandragupta II
- c) Kumaragupta I
- d) Skandagupta

**76. Who among the following led a successful military campaign against the kingdom of Srivijaya, the powerful maritime State, which ruled the Malay Peninsula, Sumatra, Java and the neighbouring islands?**

- a) Amoghavarsha (Rashtrakuta)
- b) Prataparudra (Kakatiya)
- c) Rajendra I (Chola)
- d) Vishnuvardhana (Hoysala)

**77. With reference to ancient India (600–322 BC), consider the following pairs:**

Territorial region	River flowing in the region
1. Asmaka	Godavari
2. Kamboja	Vipas
3. Avanti	Mahanadi
4. Kosala	Sarayu

How many of the pairs given above are correctly matched?

- a) Only one
- b) Only two
- c) Only three
- d) All the four

**78. The first Gandharva Mahavidyalaya, a music training school, was set up in 1901 by Vishnu Digambar Paluskar in**

- a) Delhi
- b) Gwalior
- c) Ujjain
- d) Lahore

**79. Ashokan inscriptions suggest that the 'Pradeshika', 'Rajuka' and 'Yukta' were important officers at the**

- a) village-level administration
- b) district-level administration
- c) provincial administration
- d) level of the central administration

**80. Consider the following statements in respect of the Non-Cooperation Movement:**

- I. The Congress declared the attainment of 'Swaraj' by legitimate and peaceful means to be its objective.
- II. It was to be implemented in stages with civil disobedience and non-payment of taxes for the next stage only if 'Swaraj' did not come within a year and the Government resorted to repression.

Which of the statements given above is/are correct?

- a) I only
- b) II only
- c) Both I and II
- d) Neither I nor II

**81. Consider the following types of vehicles:**

- I. Full battery electric vehicles
- II. Hydrogen fuel cell vehicles
- III. Fuel cell-electric hybrid vehicles

How many of the above are considered as alternative powertrain vehicles?

- a) Only one
- b) Only two
- c) All the three
- d) None

**82. With reference to Unmanned Aerial Vehicles (UAVs), consider the following statements:**

- I. All types of UAVs can do vertical landing.
- II. All types of UAVs can do automated hovering.
- III. All types of UAVs can use battery only as a source of power supply.

How many of the statements given above are correct?

- a) Only one
- b) Only two
- c) All the three
- d) None

**83. In the context of electric vehicle batteries, consider the following elements:**

- I. Cobalt
- II. Graphite
- III. Lithium
- IV. Nickel

How many of the above usually make up battery cathodes?

- a) Only one
- b) Only two
- c) Only three
- d) All the four

**84. Consider the following:**

- I. Cigarette butts
- II. Eyeglass lenses
- III. Car tyres

How many of them contain plastic?

- a) Only one
- b) Only two
- c) All the three
- d) None

**85. Consider the following substances:**

- I. Ethanol
- II. Nitroglycerine
- III. Urea

Coal gasification technology can be used in the production of how many of them?

- a) Only one

- b) Only two
- c) All the three
- d) None

**86. What is the common characteristic of the chemical substances generally known as CL-20, HMX and LLM-105, which are sometimes talked about in media?**

- a) These are alternatives to hydrofluorocarbon refrigerants
- b) These are explosives in military weapons
- c) These are high-energy fuels for cruise missiles
- d) These are fuels for rocket propulsion

**87. Consider the following statements:**

- I. It is expected that Majorana 1 chip will enable quantum computing.
- II. Majorana 1 chip has been introduced by Amazon Web Services (AWS).
- III. Deep learning is a subset of machine learning.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**88. With reference to monoclonal antibodies, often mentioned in news, consider the following statements:**

- I. They are man-made proteins.
- II. They stimulate immunological function due to their ability to bind to specific antigens.
- III. They are used in treating viral infections like that of Nipah virus.

Which of the statements given above are correct?

- a) I and II only
- b) II and III only
- c) I and III only
- d) I, II and III

**89. Consider the following statements:**

- I. No virus can survive in ocean waters.
- II. No virus can infect bacteria.
- III. No virus can change the cellular transcriptional activity in host cells.

How many of the statements given above are correct?

- a) Only one
- b) Only two
- c) All the three
- d) None

**90. Consider the following statements:**

Statement I: Activated carbon is a good and an attractive tool to remove pollutants from effluent streams and to remediate contaminants from various industries.

Statement II: Activated carbon exhibits a large surface area and a strong potential for adsorbing heavy metals.

Statement III: Activated carbon can be easily synthesized from environmental wastes with high carbon content.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**91. Consider the following statements:**

Statement I: Studies indicate that carbon dioxide emissions from cement industry account for more than 5% of global carbon emissions.

Statement II: Silica-bearing clay is mixed with limestone while manufacturing cement.

Statement III: Limestone is converted into lime during clinker production for cement manufacturing.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**92. Consider the following statements:**

Statement I: At the 28th United Nations Climate Change Conference (COP28), India refrained from signing the Declaration on Climate and Health.

Statement II: The COP28 Declaration on Climate and Health is a binding declaration; and if signed, it becomes mandatory to decarbonize health sector.

Statement III: If India's health sector is decarbonized, the resilience of its health-care system may be compromised.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**93. Consider the following statements:**

Statement I: Scientific studies suggest that a shift is taking place in the Earth's rotation and axis.

Statement II: Solar flares and associated coronal mass ejections bombarded the Earth's outermost atmosphere with tremendous amount of energy.

Statement III: As the Earth's polar ice melts, the water tends to move towards the equator. Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**94. Consider the following statements:**

Statement I: Article 6 of the Paris Agreement on climate change is frequently discussed in global discussions on sustainable development and climate change.

Statement II: Article 6 of the Paris Agreement on climate change sets out the principles of carbon markets.

Statement III: Article 6 of the Paris Agreement on climate change intends to promote inter-country non-market strategies to reach their climate targets.

Which one of the following is correct in respect of the above statements?

- a) Both Statement II and Statement III are correct and both of them explain Statement I
- b) Both Statement II and Statement III are correct but only one of them explains Statement I
- c) Only one of the Statements II and III is correct and that explains Statement I
- d) Neither Statement II nor Statement III is correct

**95. Which one of the following launched the Nature Solutions Finance Hub for Asia and the Pacific?**

- a) The Asian Development Bank (ADB)
- b) The Asian Infrastructure Investment Bank (AIIB)
- c) The New Development Bank (NDB)
- d) The International Bank for Reconstruction and Development (IBRD)

**96. With reference to 'Direct Air Capture', an emerging technology, which of the following statements is/are correct?**

- I. It can be used as a way of carbon sequestration.
- II. It can be a valuable approach for plastic production and in food processing.
- III. In aviation, it can be a source of carbon for combining with hydrogen to create synthetic low-carbon fuel.

Select the correct answer using the code given below:

- a) I and II only
- b) II only
- c) I, II and III
- d) None of the above statements is correct

**97. Regarding Peacock tarantula (Gooty tarantula), consider the following statements:**

- I. It is an omnivorous crustacean.
- II. Its natural habitat in India is only limited to some forest areas.
- III. In its natural habitat, it is an arboreal species.

Which of the statements given above is/are correct?

- a) I only
- b) I and III
- c) II only
- d) II and III

**98. Consider the following statements:**

- I. Carbon dioxide (CO<sub>2</sub>) emissions in India are less than 0.5 t CO<sub>2</sub> per capita.

II. In terms of CO<sub>2</sub> emissions from fuel combustion, India ranks second in Asia-Pacific region.

III. Electricity and heat producers are the largest sources of CO<sub>2</sub> emissions in India.

Which of the statements given above is/are correct?

- a) I and III only
- b) II only
- c) II and III only
- d) I, II and III

**99. Consider the following pairs:**

Plant	Description
I. Cassava	1. Woody shrub
II. Ginger	2. Herb with pseudostem
III. Malabar spinach	3. Herbaceous climber
IV. Mint	4. Annual shrub
V. Papaya	5. Woody shrub

How many of the above pairs are correctly matched?

- a) Only two
- b) Only three
- c) Only four
- d) All the five

**100. With reference to the planet Earth, consider the following statements:**

- I. Rain forests produce more oxygen than that produced by oceans.
- II. Marine phytoplankton and photosynthetic bacteria produce about 50% of world's oxygen.
- III. Well-oxygenated surface water contains several folds higher oxygen than that in atmospheric air.

Which of the statements given above is/are correct?

- a) I and II
- b) II only
- c) I and III
- d) None of the above statements is correct

## ANSWER KEY PRELIMS PRACTICE QUESTION

PRELIMS PRACTICE QUESTION	1.B	2.C	3.B	4.B	5.C	6.B	7.A	8.A	9.C	10.D
	11.D	12.A	13.D	14.C	15.A	16.C	17.C	18.A	19.B	20.D
	21.B	22.A	23.C	24.B	25.A	26.A	27.C	28.D	29.D	30.A
	31.D	32.C	33.A	34.A	35.C	36.B	37.D	38.C	39.D	40.C
	41.D	42.D	43.C	44.D	45.A	46.D	47.D	48.A	49.A	50.B
	51.B	52.A	53.B	54.B	55.D	56.C	57.A	58.A	59.A	60.A
	61.B	62.C	63.D	64.D	65.C	66.C	67.A	68.C	69.C	70.C
	71.C	72.C	73.B	74.A	75.B	76.C	77.B	78.D	79.B	80.A
	81.C	82.D	83.C	84.C	85.C	86.B	87.C	88.B	89.D	90.A
	91.A	92.C	93.A	94.A	95.A	96.C	97.D	98.C	99.B	100.B