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FORTUNE WEEKLY DIGEST

› Science & Technology Round Up › ASER Report 2024 › Pulses Production in India

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FORTUNE WEEKLY DIGEST

EDITOR'S NOTE

As UPSC aspirants, it is essential to stay updated on current affairs to excel in the examination. This **Fortune Weekly Digest (ForWarD)** brings you the latest news and developments from around the world, carefully curated and analyzed to help you prepare for the Civil Services (Main) Examination.

We understand that time is precious, and we have made sure to present the information in a concise and easy-to-understand manner.

The magazine is divided into different sections. Mains relevant topics have been covered in detail with a UPSC previous year question perspective. The jot downs are examples and interesting facts to enrich your answer writing. Cherrypicks has some key words from the week, helpful again in answer writing and essay. We have also included essay topics and sample questions to help you guage your preparation.

We have designed this magazine to best supplement the daily current affairs notes we have launched by the name of **FIND (Fortune IAS News Daily)** and **FINDER (Fortune IAS News Daily Explainer)** and the **Fortune Prelims Precise** monthly compilation. This magazine will be explained in detail and your queries addressed in a live class we conduct.

At a time when there is no dearth of current affairs materials, our hope is help you get a one-stop solution for all your current affairs needs.

This magazine is a work in progress and your feedback will be appreciated.

We hope that this magazine will serve as a valuable resource for your exam preparation and contribute to your success in the UPSC examination.

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ANNUAL STATUS OF EDUCATION REPORT (ASER) 2024

Syllabus: GS II - Education

PYQ MAPPING

Q) *Discuss the main objectives of Population Education and point out the measures to achieve them in India in detail.* ***(2021)***

Q) *How have digital initiatives in India contributed to the functioning of the education system in the country? Elaborate on your answer.* ***(2020)***

SHORT TAKES

Pedagogy: Refers to the methods and practices used in teaching, including the strategies, techniques, and approaches that educators use to facilitate learning. It is informed by educational theories and aims to promote effective, engaging, and meaningful learning experiences for students.

WHY IN NEWS

The ASER 2024 report was released by the **NGO Pratham** on January 28, 2025, revealing a modest recovery in foundational literacy and numeracy (FLN) among school students following the learning losses caused by the COVID-19 pandemic.

INTRODUCTION

The ASER 2024 offers valuable insights into the learning disparities across Indian schools, particularly in foundational literacy and numeracy. While media discussions highlight these gaps, a structured policy framework to address them is still missing at both the State and Union levels.

ANNUAL STATUS OF EDUCATION REPORT (ASER) 2024

- **About**: Conducted by Pratham, a non-governmental organization, which has been publishing the Annual Status of Education Report since 2005.
- **Scope**: ASER 2024 covered 649,491 children across 17,997 villages in 605 rural districts of India.
- **Survey Methodology**: The survey used a random selection of 30 villages from each district based on the 2011 census, and assessed children between the ages of 5 to 16.

FINDINGS

Early Childhood Education (Ages 3 to 5)

- **Preschool coverage increased** between **2018 and 2024**.
- **More than one-third** of children aged **3 to 5** attend Anganwadis
- Among **3-year-olds**, enrollment in pre-primary institutions increased from 68.1% in 2018 to 75.8% in 2022 to 77.4% in 2024.
  - Gujarat, Maharashtra, Odisha, and Telangana have achieved near-universal enrollment for this age group.
  - Meghalaya and Uttar Pradesh have the highest proportion of 3-year-olds not enrolled anywhere (over 50%).
- Among **4-year-olds**, enrollment in pre-primary institutions increased from 76% in 2018 to 82% in 2022 to 83.3% in 2024.
  - Enrollment rates in pre-primary for this age exceed 95% in states like Gujarat, Maharashtra, Karnataka, Tamil Nadu, and Odisha.
- Among **5-year-olds,** this figure also showed big increases, rising from 58.5% in 2018 to 62.2% in 2022 to 71.4% in 2024.
  - The states with enrollment exceeding 90% in pre-primary institutions for this age include Karnataka, Gujarat, Maharashtra, Kerala, and Nagaland.

Elementary Level (Ages 6 to 14) – Right to Education Act (2005)

- **Improved learning outcomes** in reading and arithmetic across most States.
- **Significant progress** in foundational skills among **Classes 1 to 3** compared to ASER 2022.

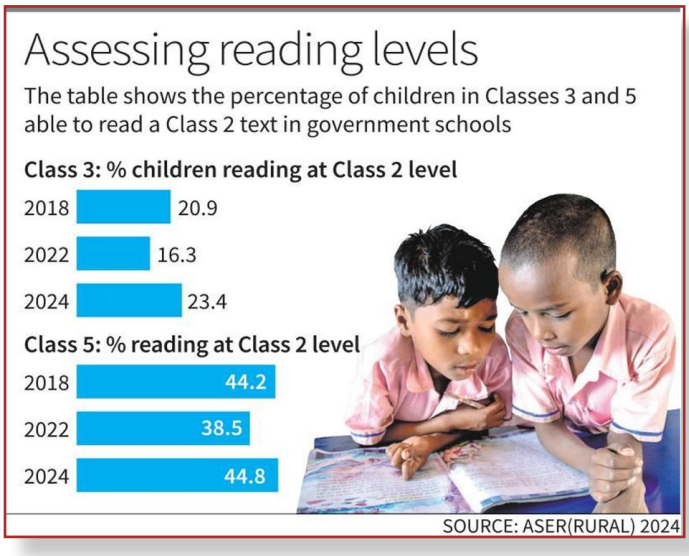
Adolescents (15-16 years)

- The percentage of 15-16-year-olds not enrolled in school has dropped to around 7%, continuing recent trends.

Decline in Government School Enrolment:

Government school enrolment decreased to **66.8%** in 2024, from the pandemic peak of 72.9% in 2022, yet learning outcomes, such as Class 3 students' reading fluency, have improved.

- **Increase in Pre-primary Enrolment**: Pre-primary enrolment has **risen to 77.4%** in 2024, largely driven by Anganwadi centres, which support both education and broader developmental outcomes like immunisation and nutrition.
- **Universal Enrolment Nearly Achieved**: The right to education mandate for universal enrolment is nearly achieved, with only 1.9% of children in the 6-14 age group still out of school, a slight increase from 2022.
- **Foundational Literacy and Numeracy (FLN)**
  - 83% of schools reported receiving government directives for FLN activities.
  - 78% of schools had at least one teacher trained in FLN.
  - 75% of schools received FLN learning materials.
- **Reading Skills**
  - **Class 3**: 23.4% can read Class 2-level text.
  - **Class 5**: 44.8% can read Class 2-level text
  - **Class 8**: 67.5% can read Class 2-level text.
  - **Languages Tested**: 19 languages were used for reading assessments.



- **Mathematical Skills**
  - **Class 3**: Two out of three students still cannot solve basic subtraction problems.
  - **Class 5**: 30.7% can solve division problems (up from 27.9% in 2018).
  - **Class 8**: 45.8% can solve basic arithmetic problems (marginally up from 44.1% in 2018).
- **Digital Literacy(Ages 14-16) :**
  - **89%** have access to smartphones at home.
  - **31.4%** own a personal smartphone.
  - **Usage Patterns**
    - **82%** use smartphones regularly.
    - **57%** use them for education-related activities.
    - **76%** browse social media.
  - **Digital Skills:**
    - **76.9%** can set an alarm, **79.3%** can browse for information, **87%** can find a video on a specific topic, **92.1%** can share videos via WhatsApp or Telegram.
  - **Awareness of Online Safety**
    - **62%** know how to block or report a profile.
    - **55.2%** know how to make their profile private.
    - **57.7%** know how to change a password.
  - In some southern states, girls performed as well as or better than boys in digital skills.
- **School Facilities:**
  - **Infrastructure Improvement**: Facilities such as usable girls' toilets (66.4% in 2018 to 72% in 2024) and drinking water availability (74.8% to 77.7%) have improved nationally.
  - **Playground Availability Stagnant**: The proportion of schools with playgrounds remains nearly unchanged, at 66.2% in 2024 compared to 66.5% in 2018.
  - **Increase in Learning Resources**: The proportion of schools using books other than textbooks rose from 36.9% in 2018 to 51.3% in 2024, reflecting a broader learning environment.
- **State Wise Improvement in Learning Levels**
  - **Moderate Improvement (4-5.9 percentage points)** – Himachal Pradesh and Bihar showed slight progress in foundational skills.
  - **Significant Improvement (6-9.9 percentage points)** – Odisha, Haryana, West Bengal, and Jharkhand recorded notable gains in reading ability.
  - **Most Improved States (10+ percentage points)** – Gujarat, Uttar Pradesh, Uttarakhand, Tamil Nadu, Sikkim, and Mizoram saw the highest rise in learning outcomes

Performance Analysis of States

Top performers

Certain States have demonstrated remarkable progress in foundational learning, particularly in reading and arithmetic skills among primary school students. This has been attributed to long-term investments in early childhood education, structured pedagogy, teacher training, and community engagement.

1. **Kerala**: Over 73% of Class 5 students in government schools can read at a Class 2 level
2. **Mizoram**: 64.9% of Class 5 students can read at a Class 2 level
3. **Himachal Pradesh**: 64.8% of Class 5 students can read at a Class 2 level
4. **Maharashtra**: After pandemic-induced learning losses, the State's reading levels for Class 5 students recovered to 59.3% in 2024, from 56.8% in 2022, demonstrating the effectiveness of post-pandemic recovery plans

Lagging States

- **Uttar Pradesh:** Significant improvement in foundational literacy since 2014, with a notable jump in Class 3 students reading at a Class 2 level from 16.4% in 2022 to 27.9% in 2024, though challenges in teacher absenteeism and instruction quality persist
- **Bihar, Madhya Pradesh, Odisha, and West Bengal**:These States continue to struggle with low literacy and numeracy levels, requiring targeted interventions to enhance foundational learning.

States Needing Critical Efforts

» **Rajasthan**: Foundational literacy has declined, with only **39.9%** of Class 5 students in government schools able to read a Class 2 level text, necessitating urgent teacher training and student engagement measures.

» **Jharkhand & Chhattisgarh**: Among the weakest in numeracy, with only **27%** of students able to perform basic division, highlighting severe learning gaps in arithmetic skills.

» **Tamil Nadu** : While **52.5%** of Class 5 students can read a Class 2 level text (above the national average), improvement has slowed, with private schools outperforming government schools, requiring urgent intervention.

» **Delhi**:The **Delhi Model Schools Initiative** has improved infrastructure and student outcomes, but learning gains are stabilising, especially in **mathematical skills**, with students struggling in division and word problems.

ISSUES

Reliance on Rote Learning: India's education system is overly reliant on rote learning and high-stakes exams, failing to assess critical thinking, creativity, and problem-solving skills effectively.

Challenges in Teacher Training: Teacher training alone is not enough to address learning gaps; continued support post-training is necessary to bridge the gap between syllabus completion and effective learning.

Unequal Policy Reach: While policy interventions have been implemented, their benefits often do not reach rural and underprivileged areas, hindering equitable education.

Digital Literacy Disparities: While 90% of children in the 14-16 age group have access to smartphones, the use of smartphones for educational purposes is limited, with a greater emphasis on social media.

GOVERNMENT INITIATIVES ON EDUCATION

NEP (2020)

- Focus on **Early Childhood Care and Education (ECCE)** for ages 3 to 6 which ensures children are ready for Class 1 through structured **three-year pre-primary education**.
- Highest priority given to achieving universal FLN.
- NEP mandates **formal school entry at age six** to ensure children are **cognitively and socially ready**.

PM eVIDYA Initiative (2020):

- A comprehensive programme under Atma Nirbhar Bharat Abhiyaan to unify digital, online, and on-air education for multi-mode learning access.

PRAGYATA Guidelines (2020):

- Provides a framework for digital education, covering online, blended, and offline modes, including support for students with special needs.

NIPUN Bharat (2021)

- Aims for universal FLN by Class 3 (age 8) by 2026-27.
- Focuses on reading with understanding and numeracy skills.

PM SHRI (2022)

- Aims to upgrade 14,500+ government-managed schools with modern infrastructure, inclusive learning environments, and quality education aligned with NEP 2020.
- Benefiting over 20 lakh students, the scheme (2022-27) will serve as a model for enhancing school education quality nationwide.

PM Vidyalaxmi (2024)

- Provides meritorious students with guarantor-free loans covering tuition fees and related expenses for higher education in top-ranked institutions (based on NIRF rankings).
- For loans up to ₹7.5 lakh, the scheme offers a 75% credit guarantee on outstanding defaults, encouraging banks to provide easy access to education loans.

Anganwadis

- Play a crucial role in **early childhood care**, integrating education, immunisation, and nutrition as a **comprehensive package.**
- Their **strong community ties** ensure better parental engagement, making them an effective option for strengthening early childhood education in states with high enrollment.

GLOBAL BEST PRACTICES

Finland

- Finland relies on **classroom-based assessments** rather than high-stakes exams.
- National assessments focus on **policy improvements** rather than student rankings.
- Teachers have autonomy in designing assessments, allowing for customised learning.

Japan and Cuba

- Incorporates **interdisciplinary, project-based learning** into assessments.
- Strong emphasis on **vocational education and skill development** at the school level, linking students to industry needs.
- Curriculum includes **real-world projects** to develop problem-solving abilities.

Germany

- **Dual education system** integrates academics with vocational training, ensuring students are work-ready.
- **Apprenticeships from high school level** allow students to gain hands-on industry experience.
- Schools collaborate with businesses to shape curricula, linking education to real-world job requirements.

WAY FORWARD

- **Focus on Rural Education:** Strengthen policy implementation in rural areas to address foundational learning gaps, ensuring equal access to resources and educational benefits.
- **Shift to Classroom-Based Assessments:** Move towards classroom-based assessments that evaluate real-world applications and critical thinking, replacing traditional rote-based exams.
- **Empower Teachers:** Provide training and autonomy to teachers, enabling them to design assessments that align with modern pedagogical approaches.
- **Adopt Interdisciplinary Learning**: Introduce interdisciplinary, skill-based learning models, inspired by countries like Japan and Cuba, to foster collaboration and problem-solving.
- **Expand Vocational Training**: Integrate vocational training and apprenticeship models at the school level, offering practical skills that align with industry needs.
- **Strengthen Data Collection**: Implement **comprehensive and continuous data collection** mechanisms to monitor the progress and challenges in ECCE, leveraging platforms like ASER and UDISE.
- **Enhance Anganwadi Resources**: Increase **resource allocation** for ECCE within the Anganwadi system, ensuring the **early childhood education component** is prioritized and adequately supported.

- **Targeted Interventions for Learning Gaps**: Implement more focused, targeted interventions in schools to address specific learning gaps and ensure that every child reaches at least the expected literacy and numeracy levels by Class 3.
- **Integrate Digital Learning Effectively**: Leverage the high penetration of smartphones by integrating digital learning into school curricula while ensuring students use these resources for educational purposes

CONCLUSION

Despite the significant progress in overcoming pandemic-induced learning loss, critical disparities in educational outcomes persist across States. The findings underscore the need for a cohesive and targeted policy intervention to ensure equitable educational growth for all children in India.

SAMPLE QUESTION

Q) The ASER 2024 report indicates state-wise disparities in learning outcomes and school infrastructure. How can India bridge the rural-urban and inter-state gaps in education quality? **(10 marks) (150 words)**

SCIENCE AND TECHNOLOGY ROUND UP

Syllabus: GS III - Science & Technology

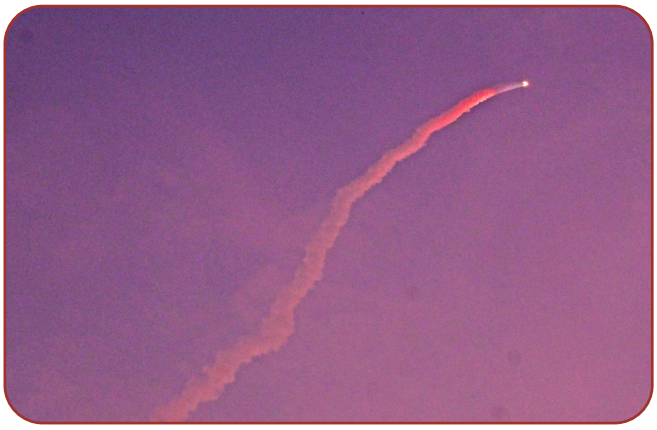
PYQ MAPPING

Q) *Launched on 25th December, 2021, James Webb Space Telescope has been much in the news since then. What are its unique features which make it superior to its predecessor Space Telescopes? What are the key goals of this mission? What potential benefits does it hold for the human race?* ***(2022)***

Q) *India has achieved remarkable successes in unmanned space missions including the Chandrayaan and Mars Orbiter Mission, but has not ventured into manned space missions, both in terms of technology and logistics? Explain critically.* ***(2017)***

Q) *Give an account of the growth and development of nuclear science and technology in India. What is the advantage of the fast breeder reactor programme in India?* ***(2017)***

ISRO's 100TH LAUNCH



WHY IN NEWS

The Indian Space Research Organisation (ISRO) launched its historic 100th launch from the Satish Dhawan Space Centre in Sriharikota.

INTRODUCTION

GSLV-F15 successfully launched the NVS-02 navigation satellite into a Geosynchronous Transfer Orbit, enhancing India's NavIC system for precise positioning services. This marks the 17th GSLV flight and the 11th using an indigenous cryogenic stage. With this mission, ISRO has completed 100 launches, placing 548 satellites in orbit.

NAVIGATIONAL SATELLITE

- The NVS series consists of five second-generation NavIC satellites—NVS-01 to NVS-05—designed to enhance India's existing navigation constellation.
- These satellites feature L1 band communication, expanding NavIC's compatibility for various applications. NVS-01, launched in 2023, was the first to carry an indigenous atomic clock.
- NVS-02 further strengthens NavIC's services, supporting navigation, precision agriculture, emergency response, fleet management, and mobile location services.
- It is equipped with a high-precision **Rubidium Atomic Frequency Standard (RAFS)** for accurate timekeeping.

NavIC: INDIA'S REGIONAL NAVIGATION SATELLITE SYSTEM

NavIC (Navigation with Indian Constellation) is India's indigenous regional navigation satellite system, developed by the Indian Space Research Organisation (ISRO). Formerly known as the Indian Regional Navigation Satellite System (IRNSS), NavIC provides highly accurate positioning, navigation, and timing services.

Constellation and Coverage

NavIC consists of a **seven-satellite constellation** and a **24x7 ground network** for continuous operations.

- **Satellite Placement**:
  - Three satellites are in **geostationary orbit** (fixed over a point on Earth).
  - Four satellites are in **inclined geosynchronous orbit** (moving relative to Earth).
- **Coverage Area**:
  - Provides navigation services across **India** and up to **1,500 km beyond its borders**.

Ground Infrastructure

The system includes a **control center, precise timing facility, range and integrity monitoring stations, and two-way ranging stations**, ensuring reliable and uninterrupted service.

NavIC Services

NavIC offers two types of services:

- **Standard Position Service (SPS)** – Available for civilian users.
- **Restricted Service (RS)** – Encrypted and meant for strategic and defense applications.

Accuracy and Interoperability

- **Location Accuracy**: Better than **20 meters** across its coverage area.
- **Timing Accuracy**: Within **40 nanoseconds**.
- **Interoperability**: NavIC's SPS signals are compatible with global navigation systems like **GPS (USA), Glonass (Russia), Galileo (EU), and BeiDou (China)**, enhancing its usability for international applications.

SIGNIFICANCE OF THE NVS SERIES IN INDIA'S NAVIGATION SYSTEM

Strengthening Self-Reliance

- Reduces dependence on foreign navigation systems like GPS.
- Enhances India's strategic autonomy in positioning and timing services.

Enhanced Civilian and Strategic Applications

- **Defense & Security**: Encrypted services for military operations.
- **Maritime & Aviation**: Reliable tracking of vessels and aircraft.
- **Railways & Transport**: Real-time train tracking and fleet management.
- **Disaster Management**: Timely life safety alerts for cyclones, tsunamis, and earthquakes.

Economic and Developmental Impact

- Supports **precision agriculture**, helping farmers optimize resources.
- Aids in **urban planning** and smart city development.
- Boosts the **Indian space industry** with indigenous satellite manufacturing and deployment.

CONCLUSION

The NVS series is a **major step in India's navigation evolution**, ensuring **secure, precise, and independent** positioning services while supporting critical sectors, technological growth, and national security.

SAMPLE QUESTION

Q)Discuss the significance of the NVS series in strengthening India's indigenous navigation system. How does it enhance the applications of NavIC in both civilian and strategic domains?**(10 marks) (150 words)**

INDIA'S FIRST HYPERLOOP TEST TRACK

WHY IN NEWS

IIT Madras has successfully completed a **410-meter Hyperloop test track**, a significant step in developing futuristic transportation technology. Additionally, the **Mumbai-Pune corridor** has been identified as the first full-scale **Hyperloop project** in India, aiming to revolutionize high-speed travel in the country.

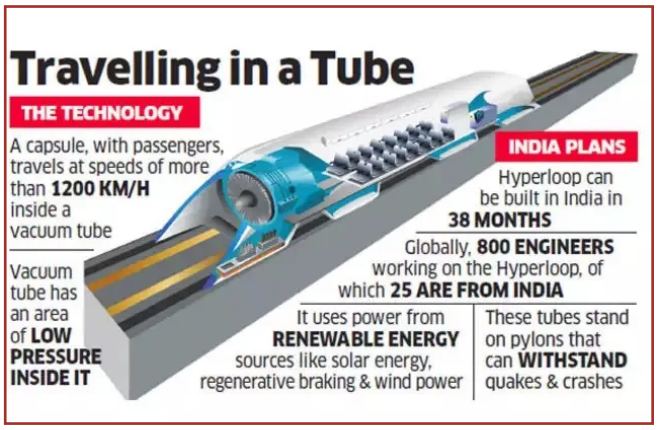
INTRODUCTION

A **Hyperloop** is an advanced transportation system in which pods, operating as pressurized vehicles, travel at exceptional speeds through low-pressure tubes.

FEATURES

- **High Speed**: Hyperloop pods can achieve speeds of up to **1,200 km/h**, with an operational speed of approximately **360 km/h**.
- **Minimal Resistance**: Functions in a **vacuum-sealed environment**, reducing friction and optimizing energy efficiency.
- **Enhanced Efficiency**: Enables **direct, point-to-point travel** without intermediate stops, ensuring faster transit times.

BENEFITS



✓ **High Energy Efficiency**

- Hyperloop systems operate in a near-vacuum environment, significantly reducing air resistance and friction.
- This leads to lower energy consumption compared to traditional high-speed rail or air travel.

✓ **Eco-Friendly and Sustainable**

- Many Hyperloop designs integrate renewable energy sources, such as solar power, to minimize environmental impact.
- The system aims to be a carbon-neutral alternative to conventional transportation.

✓ **Drastically Reduced Travel Time**

- By achieving speeds of up to 1,200 km/h, Hyperloop could make long-distance travel far more efficient.
- It enables intercity travel in minutes instead of hours, making daily long-distance commutes feasible.

CHALLENGES

High Infrastructure Costs

- Constructing vacuum tubes, stations, and maglev tracks involves substantial investment.
- The cost of maintaining such an advanced system is also a major financial challenge.

Land Acquisition Issues

- Securing land for long Hyperloop corridors is particularly difficult in densely populated regions.
- Legal and regulatory hurdles can further delay project implementation.

Technological and Safety Barriers

- Perfecting key components such as magnetic levitation, vacuum-sealed tunnels, and emergency protocols requires extensive R&D.
- Ensuring passenger safety at ultra-high speeds remains a critical challenge before large-scale deployment.

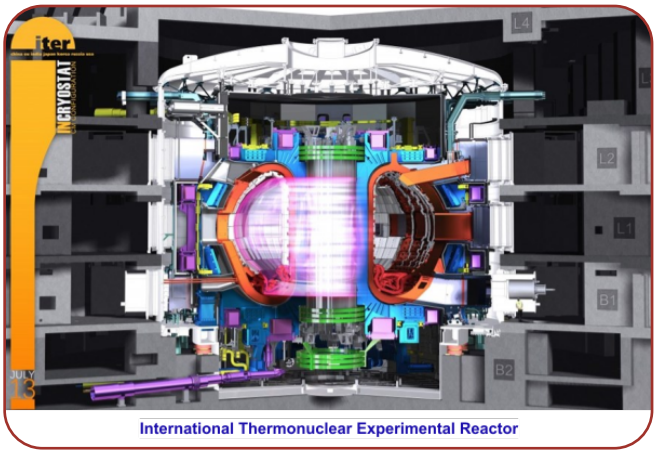
CONCLUSION

While Hyperloop technology holds the potential to revolutionize transportation by making it faster, greener, and more efficient, significant financial, logistical, and technological challenges must be overcome to bring it to reality.

SAMPLE QUESTION

Q)Hyperloop technology has the potential to revolutionize transportation by offering high-speed, energy-efficient, and sustainable travel. Discuss its benefits and the major challenges in its implementation, particularly in the Indian context. **(10 marks) (150 words)**

INTERNATINOAL THERMONUCLEAR EXPERIMENTAL REACTOR (ITER)



International Thermonuclear Experimental Reactor

INTRODUCTION

- The **International Thermonuclear Experimental Reactor (ITER)** is the world's largest and most advanced **Tokamak**, designed to facilitate large-scale **magnetic fusion reactions** for carbon-free and sustainable energy.
- Currently under construction in **France**, ITER aims to achieve **"burning plasma"**, a critical step toward sustained fusion reactions. As a **collaborative effort of 35 nations**, it serves as a vital bridge between experimental fusion devices and future industrial fusion power plants.

WHY IN NEWS

Recently, Prime Minister of India Narendra Modi visited the ITER facility in France, accompanied by French President Emmanuel Macron. The visit brought into light the progress of ITER, especially the assembly of the world's largest tokamak. This initiative is crucial for demonstrating fusion as a viable, carbon-free energy source.

TOKAMAK

A **Tokamak** is a device that uses **magnetic fields** to confine plasma for fusion reactions. The energy produced from atomic fusion heats the walls, which can be converted into electricity. **ITER's Tokamak** aims to start **deuterium-tritium fusion** by **2039**.

INDIA'S CONTRIBUTION TO ITER

India joined the **ITER Project in 2005**, aiming to advance its **nuclear fusion research**. The **Institute for Plasma Research (IPR)** under the **Department of Atomic Energy** oversees India's role in ITER and manages domestic tokamaks **ADITYA-U** and **SST-1**.

ITER-India:

- ITER-India is the Indian domestic agency and a specially empowered project of the IPR contributing to the ITER collaboration.
  - It is responsible for the delivery of key ITER packages including Cryostat, In-wall Shielding, Cooling Water System, Cryogenic System, Ion-Cyclotron RF Heating System, Electron Cyclotron RF Heating System, Diagnostic Neutral Beam System, Power Supplies, and some Diagnostics.
- As a regular member, India contributes 9% of the operating costs.

SIGNIFICANCE OF ITER

- **Future Energy Source** – ITER bridges today's experimental fusion research with future **commercial fusion power plants**, offering a **GHG-free and radiation-free** alternative to fossil fuels and nuclear fission.
- **Extended Operation Time** – ITER aims to achieve **"burning plasma"**, sustaining fusion reactions for **400–600 seconds**, significantly longer than existing reactors.
- **Sustainability** – With a **fusion gain (Q) >10**, ITER enhances the feasibility of large-scale fusion energy production.
- **Advancing Plasma Physics** – ITER will expand research in **plasma physics**, driving innovation in plasma-based technologies.

CHALENGES OF ITER

- **Radiation Hazards** – **Intense fusion radiation** can degrade materials like steel, posing risks of structural failure.
- **Potential Radiation Leaks** – The use of **radioactive fuels (Deuterium-Tritium)** requires strict safety protocols to prevent **operational mishaps**.
- **Magnet Quality Concerns** – Some ITER magnets have faced **cracks and defects**, affecting the **precision and efficiency** of plasma confinement.
- **Complex Installation & Integration** – Critical systems such as **diagnostics, cooling, and vacuum systems** are still in development, posing **engineering challenges** in assembling and integrating ITER's components

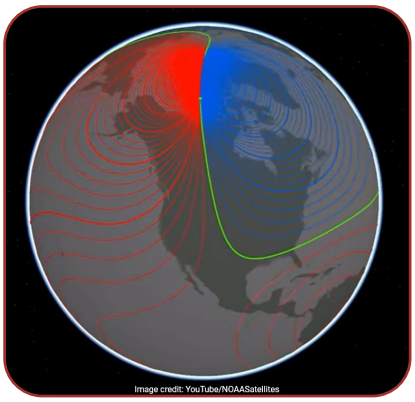
CONCLUSION

Despite its challenges, ITER is a landmark project in **fusion energy research**, with India's active participation reinforcing its commitment to **sustainable and advanced energy solutions**.

SAMPLE QUESTION

Q) The International Thermonuclear Experimental Reactor (ITER) represents a major step toward harnessing fusion energy as a sustainable power source. Discuss India's contributions to the ITER project and analyze the key challenges associated with its implementation **(10 marks) (150 words)**

SHIFTING OF EARTH'S MAGNETIC NORTH POLE



WHY IN NEWS

Recent studies have highlighted significant **shifts in the Earth's magnetic north pole**, influencing **space weather, satellite systems, and charged particle dynamics** in the magnetosphere. Understanding these changes is crucial for **predicting space weather events** and ensuring **satellite safety**.

REASON

The shift in Earth's magnetic north pole is primarily driven by **changes in the movement of molten iron and nickel** in the outer core, which generates the planet's magnetic field. Variations in **fluid flow patterns** have weakened the magnetic field in Canada while strengthening it in Siberia, causing the pole to drift eastward.

MOVEMENT OF THE NORTH MAGENTIC POLE

- The **north magnetic pole** has been drifting from **Canada toward Siberia** for over a century.
- Initially moving slowly, its speed **accelerated to approximately 50 km per year by 2020**.
- This shift **alters the Earth's magnetic field**, affecting how **charged particles behave in space**.
- The **World Magnetic Model**, developed by the **British Geological Survey and NOAA**, tracks these movements and is updated every **five years**.

HISTORICAL CONTEXT OF THE MAGNETIC NORTH POLE

- The **magnetic north pole** was discovered by **Sir James Clark Ross in 1831** in northern Canada.
- Over the past **400 years**, it moved at an average speed of **10 km per year** but has recently **accelerated significantly**.
- Scientists continue to monitor this rapid shift, as it may have **long-term geophysical and technological implications**.

IMPACT ON THE CHARGED PARTICLES AND THE MAGNETOSPHERE

- **Charged particles** (electrons and protons) within the Earth's **radiation belts** are guided by the magnetic field.
- As the **magnetic pole shifts**, it changes the **trajectories and penetration altitudes** of these particles.
- This influences their interaction with **Earth's atmosphere**, altering **ionospheric conditions and space weather**.

SCIENTIFIC STUDIES AND FINDINGS

- Researchers at the **Indian Institute of Geomagnetism** used the **International Geomagnetic Reference Field model** to study the impact of the pole's movement.
- Their simulations revealed that as the **pole moves toward Siberia**, charged particles previously entering the atmosphere at lower altitudes now reach higher altitudes, increasing by up to **1,200 km**.

EFFECTS ON SATTELITES AND SPACE WEATHER

- **Satellites in polar orbits** experience changes in **atmospheric drag** due to fluctuations in **charged particle penetration**.
- Altered **atmospheric density** affects satellite **orbits and stability**.
- Increased **energy deposition** by charged particles can **heat the atmosphere**, further impacting **satellite operations**.

CONCLUSION

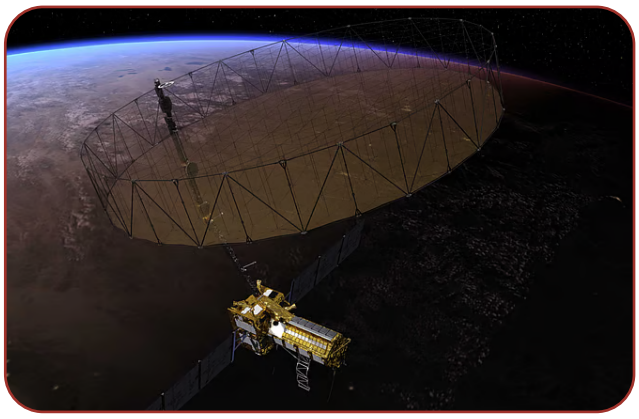
The accelerating **shift in Earth's magnetic north pole** is reshaping **charged particle dynamics**, impacting **space weather, satellite operations, and navigation systems**. Continuous monitoring and **updated geomagnetic models** are essential to adapt to these changes and mitigate potential risks.

SAMPLE QUESTION

Q)The rapid shift of Earth's magnetic north pole has significant implications for navigation, space weather, and satellite operations. Discuss the reasons behind this movement and its potential impact. **(10 marks) (150 words)**

NASA-ISRO SYNTHETIC APERTURE RADAR (NISAR)

The **NASA-ISRO Synthetic Aperture Radar (NISAR)** satellite is a **landmark collaboration** between **NASA (USA)** and **ISRO (India)**, aimed at enhancing **Earth observation, disaster management, and infrastructure safety**. Scheduled for launch in early **2024** from **Satish Dhawan Space Centre** aboard ISRO's **GSLV Mk II rocket**, NISAR will provide **unparalleled data on Earth's surface changes**.



KEY FEATURES AND CAPABILITIES

Advanced Earth Monitoring

- Tracks **earthquakes, landslides, volcanic activity, glacier shifts, and infrastructure stability**.
- Scans nearly the **entire planet** twice every **12 days**, enabling **continuous observation**.

Cutting-Edge Radar Technology

- First satellite to use **both L-band and S-band radars**, allowing it to function **day and night, even through clouds**.
- Can **penetrate dense vegetation**, crucial for monitoring **hidden fault lines and volcanic regions**.

Disaster Preparedness and Risk Assessment

- **Identifies high-risk seismic zones** by analyzing **fault line movements**.
- **Detects early signs of landslides and volcanic eruptions** by tracking ground shifts.
- Improves **understanding of Earth's crustal movements**, helping assess **long-term risks**.

Infrastructure Monitoring and Post-Disaster Response

- Helps authorities **detect early structural weaknesses** in levees, aqueducts, and essential infrastructure.
- Provides **real-time data on damage after disasters**, aiding in **faster emergency response and recovery efforts**.

SIGNIFICANCE AND INTERNATIONAL COLLABORATIONS

The **NISAR mission exemplifies the power of global cooperation** in tackling **geophysical and environmental challenges**. While NASA's **Jet Propulsion Laboratory (JPL)** leads the US contributions, **ISRO's U R Rao Satellite Centre** is responsible for the spacecraft and launch services.

CONCLUSION

Having passed **space environment tests in 2023**, NISAR is poised to be a **game-changer in Earth science, disaster mitigation, and climate monitoring**, benefiting governments, researchers, and communities worldwide.

SAMPLE QUESTION

Q) The NASA-ISRO Synthetic Aperture Radar (NISAR) satellite is expected to revolutionize Earth monitoring and disaster preparedness. Discuss its key features, significance, and potential impact on disaster management and infrastructure safety **(10 marks) (150 words)**

MONETARY POLICY COMMITTEE (MPC) POLICY REVIEW 2025

Syllabus: GS III - Economy

PYQ MAPPING

Q) Do you agree with the view that steady GDP growth and low inflation have left the Indian economy in good shape? Give reasons in support of your arguments. **(2019)**

Q) Is inclusive growth possible under market economy? State the significance of financial inclusion in achieving economic growth in India. **(2021)**

WHY IN NEWS

The Reserve Bank of India's (RBI) Monetary Policy Committee (MPC) convened from February 5 to 7, 2025, marking the final meeting of the fiscal year and the first under Governor Sanjay Malhotra.

INTRODUCTION

The RBI's Monetary Policy Committee (MPC) reduced the repo rate by 25 basis points to 6.25%, aiming to **stimulate economic growth by making borrowing cheaper**. This move, coupled with fiscal measures like income tax cuts, reflects a **coordinated effort** to boost consumption and investment.

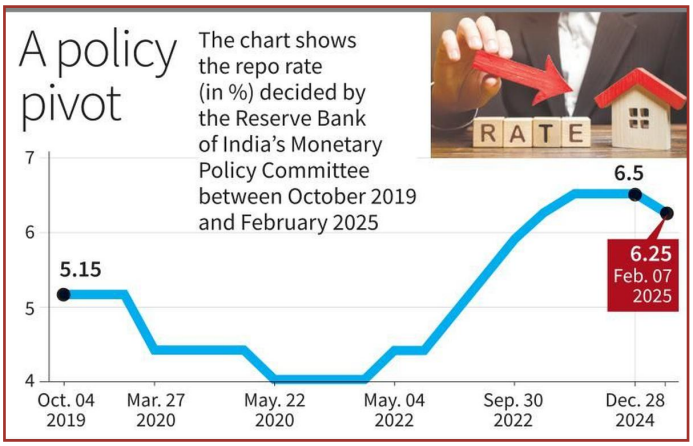
SHORT TAKES

- **Monetary Policy Committee (MPC):**
  - A six-member body of the Reserve Bank of India (RBI) responsible for setting the repo rate and formulating monetary policy to achieve price stability and economic growth.
  - It meets bi-monthly to assess inflation, growth, and financial conditions, making decisions based on a majority vote.
- **Repo Rate:** The interest rate at which the RBI lends short-term funds to commercial banks, influencing borrowing costs and liquidity in the economy.
- **External Benchmark Lending Rate (EBLR)**: The interest rate banks charge on loans, directly linked to external benchmarks like the repo rate, ensuring faster transmission of rate changes.
- **Equated Monthly Instalments (EMIs)**: Fixed monthly payments made by borrowers to repay loans, affected by changes in interest rates due to repo rate adjustments.
- **Standing Deposit Facility (SDF) Rate**: The interest rate at which banks can park excess liquidity with the RBI without the need for collateral.
- **Marginal Standing Facility (MSF) Rate**: The interest rate at which banks can borrow emergency funds from the RBI overnight against approved securities.
- **Retail Inflation (CPI Inflation) :** The Consumer Price Index (CPI)-based measure of price changes in goods and services, reflecting the cost of living for households.
- **Headline Inflation**: The total inflation in an economy, including food and fuel prices, which can be highly volatile.

KEY ASPECTS

- **Repo Rate Cut**: The RBI's Monetary Policy Committee (MPC) reduced the repo rate by 25 basis points to **6.25%** from 6.5%, marking the **first rate cut since May 2020**.
  - **Objective**: The rate cut aims to boost economic activity by making borrowing cheaper, encouraging spending and investment.
    - The decision follows the Centre's recent personal income tax cut, indicating a coordinated effort to stimulate consumption.
  - **Impact of Repo Rate Cut**: The reduction is expected to lower external benchmark lending rates (EBLR) and equated monthly instalments (EMIs), easing borrowing costs.
- **Monetary Policy Stance**: The MPC retained a "neutral" stance to provide flexibility in responding to macroeconomic changes.
- **GDP Growth Projection**: The RBI projected GDP growth at **6.7%** for 2025-26, aligning with the government's estimate of 6.3-6.8%.
- **Cybersecurity Measures**:
  - The RBI introduced additional authentication for international digital payments.
  - Banks will have the domain name **"bank.in,"** and non-banking financial institutions (NBFCs) will use **"fin.in"** to enhance online security.

- **Forex Market Intervention**: The RBI reaffirmed its commitment to maintaining exchange rate stability without targeting specific levels, intervening only to manage excessive volatility.
- **Liquidity Management:** The RBI acknowledged tight liquidity conditions in December-January and announced measures to ensure adequate liquidity in the system.
- **External Sector Resilience:** Forex reserves stood at $630.6 billion as of January 31, providing an import cover of over 10 months, keeping the current account deficit within sustainable levels.
- **Global Economic Concerns**: The RBI acknowledged global uncertainties, including trade tensions, inflation in services, and financial market volatility, affecting emerging markets like India.
- **Regulatory Approach**: The RBI will continue a consultative approach in policy making, ensuring smooth implementation of major regulations in a phased manner.
- **Other Adjustments:**
  - Standing Deposit Facility (SDF) rate: 6.00%
  - Marginal Standing Facility (MSF) rate & Bank Rate: 6.50%
  - India's Economic Growth (2024-25):GDP Growth Estimate: 6.4% YoY, driven by private consumption recovery; (Quarterly estimates: Q1 - 6.7%, Q2 - 7.0%, Q3 & Q4- 6.5% each)



  - Headline Inflation: Declined from 6.2% in Oct 2024 to lower levels in Nov-Dec 2024 due to falling food inflation
- **Inflation Outlook**
  - Retail inflation (CPI) projection for 2025-26: **4.2%**.
    - **Q1: 4.5%**, **Q2: 4.0%**, **Q3: 3.8%**, **Q4: 4.2%**.
  - Inflation forecast for **2024-25 retained at 4.8%**.
  - **CPI inflation in December 2024 fell to 5.22%** (a four-month low) due to lower food inflation, down from **5.48% in November**.
  - MPC noted that **inflation has declined**, and is expected to moderate further in **2025-26**, aligning with the target.

IMPACT OF RBI'S MONETARY POLICY DECISIONS

- **Cheaper Borrowing:** The repo rate cut reduces borrowing costs for businesses and individuals, encouraging credit growth.
- **Boost to Consumption & Investment:** Lower interest rates make loans more affordable, promoting higher spending and capital investment.
- **Reduced EMIs & Lending Rates:** External benchmark lending rates (EBLR) and EMIs for existing borrowers are expected to decrease, improving affordability.
- **Economic Growth Acceleration:** With GDP growth projected at 6.7%, the rate cut supports the government's efforts to maintain a stable economic expansion.
- **Controlled Inflation:** Inflation is expected to moderate, with CPI projected at 4.2% in 2025-26, helping maintain price stability.
- **Stable Forex Market:** RBI's intervention aims to manage volatility without targeting specific exchange rate levels, ensuring external stability.
- **Cybersecurity Strengthening:** Enhanced authentication measures and secure domain policies help protect digital transactions from fraud risks.
- **Market Confidence Boost:** A neutral monetary stance signals flexibility, reassuring investors and businesses about policy adaptability.
- **Regulatory Clarity & Stability:** RBI's consultative approach ensures smooth regulatory transitions, reducing uncertainty for financial institutions.
- **Mitigation of Global Risks:** Proactive policy adjustments help cushion India from global financial instability, trade wars, and inflationary pressures.

ANALYSIS

- **Growth vs. Inflation Balancing**: The rate cut indicates a shift towards supporting growth amid slowing economic activity, while inflation is expected to remain within target.
- **Monetary Policy Flexibility**: Retaining a neutral stance allows RBI to respond dynamically to evolving inflation-growth dynamics, considering global uncertainties.
- **Impact on Borrowers & Banks**: Lower repo rates will reduce loan interest rates, boosting credit demand, but may pressure bank margins if deposit rates are not adjusted.
- **External Risks**: Global trade uncertainties, US monetary policy changes, and geopolitical tensions pose risks to India's growth and financial stability, requiring cautious policymaking.
- **Digital Financial Security**: The RBI's cybersecurity measures reflect increasing digital transaction risks, reinforcing its proactive stance on financial safety.

WAY FORWARD

- **Monetary Policy Calibration**: The RBI should adopt a **data-driven approach** to future rate cuts, ensuring inflation remains within the **target band** while supporting growth.
- **Strengthening Monetary Transmission**: Banks must be encouraged to **pass on the benefits** of rate cuts to borrowers **more effectively**, ensuring lower lending rates reach businesses and households.
- **Fiscal-Monetary Coordination**: The government and RBI should **align policies** to sustain economic recovery, balancing **tax incentives, public investment, and monetary measures**.
- **Inflation Management**: Close monitoring of **food and fuel prices**, along with **supply-side interventions**, will be crucial to keeping inflation within **the 4% target**.
- **Boosting Private Investment**: The government should implement **policy reforms** to encourage private sector investment, focusing on **ease of doing business, credit availability, and infrastructure development**.
- **Strengthening Financial Sector Stability**: The RBI should **monitor non-performing assets (NPAs)** and ensure **adequate liquidity in the banking system** to prevent financial stress.
- **Enhancing Cybersecurity in Digital Banking**: Continued investment in **fraud prevention, regulatory compliance, and security protocols** is essential to safeguard financial transactions.
- **Exchange Rate Stability**: The RBI should continue **calibrated forex interventions** to prevent excessive volatility while allowing the rupee to adjust to market forces.
- **Mitigating Global Risks**: Policymakers must remain vigilant against **external shocks**, such as trade tensions and geopolitical risks, and diversify **India's export markets** to reduce dependence on a few economies.
- **Sustainable Economic Growth** : A long-term strategy focusing on **green energy, digital economy expansion, and inclusive growth policies** will ensure stable and sustainable economic progress.

CONCLUSION

While the rate cut is expected to ease borrowing costs and support economic recovery, effective monetary transmission and inflation management remain key challenges. A balanced approach, integrating fiscal and monetary policies, will be crucial to sustaining growth while ensuring financial stability.

SAMPLE QUESTION

Q) How might the RBI's decision to cut the repo rate impact the financial sector's lending behaviour, and what long-term effects could this have on consumer spending and investment patterns in India? **(10 marks) (150 words)**

PULSES PRODUCTION IN INDIA

Syllabus: GS III - Major crops-cropping patterns in various parts of the country

PYQ MAPPING

Q) *What do you mean by Minimum Support Price (MSP)? How will MSP rescue the farmers from the low income trap?* ***(2018)***

Q) *What are the present challenges before crop diversification? How do emerging technologies provide an opportunity for crop diversification?* ***(2021)***

WHY IN NEWS

Finance Minister Nirmala Sitharaman has announced the launch of a six-year 'Mission for Aatmanirbharta (self-reliance) in Pulses' with a special focus on *tur/arhar* (pigeonpea), *urad* (black gram) and *masoor* (red lentil).

INTRODUCTION

India's push for self-sufficiency in pulses faces renewed challenges despite previous achievements, with rising imports and policy inconsistencies affecting domestic production. The government's latest initiative aims to enhance MSP-based procurement and boost cultivation, but structural and market-related hurdles persist.

SHORT TAKES

- **National Agricultural Cooperative Marketing Federation of India Ltd (NAFED):** Established on 2nd October 1958 under the Multi-State Co-operative Societies Act to promote cooperative marketing of agricultural produce for farmers' benefit. Its General Body, comprising farmer members, oversees its functioning.
- **National Cooperative Consumers' Federation Of India Limited (NCCF):** Established on 16th October 1965, it is the apex body of consumer cooperatives in India, registered under the Multi-State Co-operative Societies Act, 2002, with its headquarters in New Delhi. It promotes the consumer cooperative movement by facilitating voluntary formation and democratic functioning of cooperatives for economic and financial autonomy.
- **Duty-Free Imports:** Imports exempted from tariffs or customs duties, often used to stabilise market supply but can negatively impact domestic farmers.

WHAT ARE PULSES?

- Pulses are **edible seeds of leguminous plants** that are high in protein, fibre, and essential nutrients.
- They play a crucial role in India's **food security, crop diversification, and soil fertility** by fixing nitrogen in the soil.
- Pulses are 20 to 25 percent protein by weight which is double the protein content of wheat and three times that of rice.
- India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world.

MAJOR TYPE OF PULSES IN INDIA AND THEIR FEATURES

Pulse	Major Producing States	Key Features
Chana (Chickpea)	Maharashtra, Madhya Pradesh, Rajasthan,	Largest produced pulse in India, grown in rabi season.
Tur/Arhar (Pigeon Pea)	Uttar Pradesh, Madhya Pradesh, West Bengal	Long-duration crop (150-180 days), grown in kharif season, key dal for Indian cuisine.
Moong (Green Gram)	Rajasthan, Madhya Pradesh, Maharashtra	Short-duration (50-75 days), grown in multiple seasons (kharif, rabi, summer), high digestibility.
Urad (Black Gram)	Madhya Pradesh, Uttar Pradesh, Maharashtra	Rich in protein and iron, grown in both kharif and rabi seasons, requires warm climate.

Masoor (Lentil)	Madhya Pradesh, Uttar Pradesh, West Bengal	Grown in rabi season, drought-tolerant, high in iron.
Matar (Peas)	Uttar Pradesh, Madhya Pradesh, Bihar	Grown in rabi season, used for fresh and dried consumption.
Rajma (Kidney Beans)	Odisha, Madhya Pradesh, Chhattisgarh	Grown in hilly regions, protein-rich, requires cool climate.
Lobia (Cowpea)	Rajasthan, Madhya Pradesh, Karnataka	Grown in dryland conditions, drought-resistant, used for fodder and human consumption.

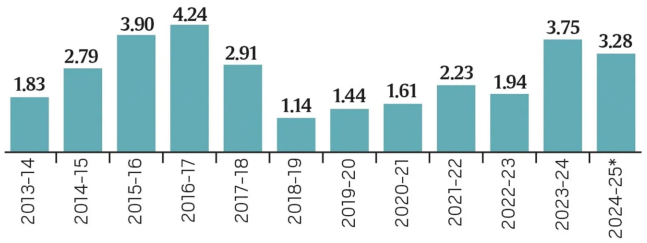
IMPORT TRENDS

Surge in Imports:

- Pulses imports in April-November 2024 stood at $3.28 billion, a 56.6% rise from $2.09 billion in 2023.
- Masoor shipments at a record 16.76 lt and tur/arhar crossing 10 lt for the first time.

Historical Import Trends: Imports peaked at 66.09 lt ($4.24 billion) in 2016-17, dropped to 24.96 lt ($1.94 billion) in 2022-23, but surged again to 47.38 lt ($3.75 billion) in 2023-24 due to drought.

IMPORTS OF PULSES (IN $ BILLION)



*April-November. Source: Department of Commerce.

IMPORTS OF MAJOR PULSES (IN LAKH TONNES)

	Peas (Matar)	Chickpea (Chana)	Lentil (Masoor)	Pigeonpea (Tur/Arhar)	Urad & Moong**
2014-15	19.52	4.19	8.16	5.75	6.23
2015-16	22.45	10.31	12.60	4.63	5.82
2016-17	31.73	10.81	8.29	7.04	5.75
2017-18	28.77	9.81	7.97	4.13	3.47
2018-19	8.51	1.86	2.49	5.31	5.74
2019-20	6.67	3.71	8.54	4.50	3.82
2020-21	0.46	2.95	11.16	4.43	4.17
2021-22	0.01	2.02	6.67	8.40	8.07
2022-23	0.01	0.63	8.58	8.94	5.57
2023-24	11.76	2.85	16.76	7.71	6.29
2024-25*	15.77	2.92	5.91	10.00	5.30

*April-November; **Black & Green Gram. Source: Department of Commerce.

PULSES PRODUCTION TRENDS

Overall Growth: Domestic production increased from 192.55 lt in 2013-14 to 273.02 lt in 2021-22 and 260.58 lt in 2022-23.

Key Contributors: Chana and moong have driven this growth, with chana production rising from 95.26 lt (2013-14) to 135.44 lt (2021-22), and moong from 14.56 lt to 36.76 lt in the same period.

Technological Advancements in Pulses Cultivation

- **Short-Duration Chana:** New varieties mature in 100-120 days (earlier 140-150 days) with minimal irrigation.
- **Multiple Moong Crops:** Farmers now cultivate four crops annually—kharif, rabi, spring, and summer—with maturity periods ranging from 50-75 days.
- **Photo-Thermo Insensitive Varieties:** Developed for moong, enabling year-round cultivation in diverse climates.

Government's MSP Procurement Efforts

- Chana Procurement: 25.56 lt in 2022-23 and 23.53 lt in 2023-24.
- Moong Procurement: 4.08 lt in 2022-23 and 3.35 lt in 2023-24.
- Future Expansion: The new initiative aims to extend similar MSP procurement strategies to tur/arhar, urad, and masoor

CHALLENGES

- **Long Crop Duration & Low Yields:**
  - Despite breeding improvements, tur/arhar still takes 150-180 days with yields of 15-16 quintals/ha, limiting its expansion beyond rainfed areas in Maharashtra and Karnataka.
  - Indian pulse yield stands at **one tonne per hectare**, while Canada produces **four tonnes per hectare**.
- **Need for Hybrid Varieties:** Achieving self-sufficiency requires hybrids maturing in 140-150 days with 18-20 quintals/ha yields and mechanical harvesting adaptability.
- **Policy Ambiguity:** While the government promotes pulses cultivation, current market prices for tur/arhar remain below MSP, discouraging farmers.
- **Impact of Duty-Free Imports**: The government's extension of duty-free imports until March 2026 affects domestic prices and farmer incentives.
- **Competing Crop Choices:** Farmers may prefer high-income crops like sugarcane and cereals over pulses, reducing overall acreage expansion.
- **Limited Irrigation and Infrastructure Support**
  - Major pulse-growing states like Rajasthan, Maharashtra, and Madhya Pradesh rely on **rainfed agriculture**.
  - Lack of **mechanisation and modern farming techniques** hinders productivity.
- **Stray Animal Damage:** Pulses, particularly tur, suffer significant damage from stray cattle, which has deterred farmers from cultivating them.

GOVERNMENT INITIATIVES FOR PULSES PRODUCTION

- **Key Announcements of Union Budget 2025-26**
  - **Budget Allocation:** ₹1,000 crore allocated for an MSP-based procurement and post-harvest warehousing scheme for three pulses crops.
  - **Procurement Agencies**: National Agricultural Cooperative Marketing Federation of India Limited (NAFED) and National Cooperative Consumers' Federation of India Limited (NCCF) will procure pulses from registered farmers under pre-agreed terms.
- **Price Support Scheme (PSS) under Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA)**
  - Implemented by the Department of Agriculture and Farmers' Welfare (DA&FW).
  - Ensures **MSP-based procurement** of notified oilseeds, pulses, and copra.
  - For Tur, Masoor, and Urad, the 25% procurement limit has been lifted for 2023-24 and 2024-25 to encourage higher domestic production.
- **National Food Security Mission (NFSM)**
  - Implemented in **28 States & 2 Union Territories (J&K and Ladakh)**.
  - Aims to increase production of **foodgrains, including pulses**, through improved seeds, technology, and farm practices.
- **Crop Diversification Programme (CDP)**
  - Focuses on **Haryana, Punjab, and Western Uttar Pradesh** (Original Green Revolution States).
  - Encourages farmers to shift from **water-intensive paddy** to **pulses, oilseeds, coarse cereals, and nutri-cereals**.
- **Rashtriya Krishi Vikas Yojana (RKVY)**
  - Provides financial flexibility to states for state-specific agricultural needs.
  - Helps in promoting pulses cultivation through infrastructure development and farmer support.
- **Tur Dal Procurement Portal**
  - A dedicated online portal was launched in January 2024 for farmers to register and sell tur directly to NAFED and NCCF, with plans to expand it for urad, masoor, and maize farmers.
- **Indian Institute of Pulses Research (IIPR):**
  - Established under Indian Council of Agricultural Research (ICAR), conducts research on pulse crops, develops high-yield varieties, improves production technologies, and coordinates pulse research nationwide.
  - Originating from the All India Coordinated Pulses Improvement Project (AICPIP) in 1966, it became the Directorate of Pulses Research (DPR) in 1984 and was restructured as IIPR in 1993
  - Contributes to nutritional security, soil health improvement, and sustainable pulse production through research, technology transfer, and breeder seed production.

WAY FORWARD

- **Improved Water Management:** Promote efficient irrigation systems and water conservation methods to make pulse cultivation viable in water-scarce regions.
- **Accelerated Breeding Research:** Invest in developing high-yielding, short-duration, and machine-harvestable hybrids for tur/arhar and other pulses.
- **Adjust Imports and Taxes Based on Harvest:** The government should base import decisions and taxes on the domestic harvest, allowing for timely and effective responses to fluctuations in domestic production.
  - Gradually reintroduce tariffs on pulses imports to protect domestic farmers and stabilise market prices.
- **Targeted MSP Procurement Expansion:** Extend effective procurement mechanisms to tur/arhar, urad, and masoor to ensure price support.
- **Incentivising Pulses Cultivation:** Provide financial and infrastructural support to shift farmers from water-intensive crops to pulses.
- **Strengthening Post-Harvest Infrastructure:**
  - Enhance **warehousing and cold storage** to minimise post-harvest losses.
  - Strengthen **farmer producer organisations (FPOs)** for better market access.
- **International Trade Strategy:** Establish long-term trade agreements to regulate import quantities and avoid supply shocks affecting domestic prices.
- **Awareness Campaigns:** Educate farmers on the long-term benefits of pulses, such as soil health improvements and the profitability of pulse intercropping.

CONCLUSION

Achieving near-aatmanirbharta in pulses requires a balanced approach of research-driven productivity gains, supportive policies, and strategic trade regulations. By addressing key challenges and ensuring fair price realisation for farmers, India can reduce its dependence on imports while strengthening food security.

SAMPLE QUESTION

Q) Analyse the role of pulses in ensuring nutritional security in India. How can the government incentivise pulse production to reduce import dependence? **(10 marks) (150 words)**

WEEKLY DOSSIERS

ELECTOR SURGE IN MAHARASHTRA AND DELHI ASSEMBLY POLLS

The increase in the number of electors in Maharashtra and Delhi during the recent Assembly elections (2024–2025) raised political concerns, particularly from the Leader of the Opposition. He questioned why voter additions over a few months outpaced those recorded over several years. However, an analysis of Election Commission data reveals that such elector surges are not unusual and follow historical trends.

ELECTORAL TRENDS AND DATA ANALYSIS

Maharashtra

- **Elector Addition (April 2024 – November 2024, 215 days):** 39.6 lakh
- **Elector Addition (October 2019 – April 2024, 1,642 days):** 32.2 lakh
- **Elector Addition Rate (2024, per day):** 18,434 voters
- **Comparative Analysis:**
  - **2004 (176 days):** 29.5 lakh (16,782 per day)
  - **2009 (unknown days):** 30 lakh
  - **2014 (unknown days):** 27.2 lakh
  - **2019 (unknown days):** 11.6 lakh

Despite the concerns, the daily elector addition in 2024 (18,434) is not significantly higher than in previous elections (e.g., 16,782 in 2004).

Delhi

- **Elector Addition (May 2024 – February 2025, 256 days):** 3.9 lakh
- **Elector Addition (February 2020 – May 2024, 1,568 days):** 4.16 lakh
- **Comparative Analysis:**
  - **2019–2020 (272 days):** 4.7 lakh
  - **2014–2015 (unknown days):** 6.02 lakh
  - **2013–2014 (127 days):** 7.7 lakh

Past trends in Delhi show even higher surges in shorter periods, making the 2024–2025 increase appear consistent with historical patterns.

FACTORS INFLUENCING ELECTOR SURGE

- **Migration Patterns:** Urban migration contributes to voter registration spikes before elections.
- **Electoral Awareness:** Voter registration drives by Election Commissions often intensify before elections.
- **Technology & E-Governance:** Improved online voter registration has streamlined new voter additions.
- **Political Mobilization:** Welfare schemes and political campaigns may encourage voter registration surges before elections.
- **Chief Electoral Officers' Effectiveness:** Variations in elector additions between States could indicate differences in administrative efficiency.

COMPARATIVE ANALYSIS WITH JHARKHAND AND HARYANA

Unlike Maharashtra and Delhi, Jharkhand and Haryana showed opposite trends:

- **Longer election gaps resulted in higher voter additions.**
- **Shorter gaps led to smaller elector increases.**
- **Possible reasons:** Differences in administrative strategies, population growth, and voter registration campaigns.

CHALLENGES AND CONTROVERSIES

- **Political Accusations:** Concerns about voter list manipulation for electoral advantage.
- **Mismatch in Registration Patterns:** Some States see steady increases, while others have erratic surges.
- **VVPAT & Electoral Integrity:** Need for transparent validation of voter lists to address suspicions.

RECOMMENDATIONS FOR ELECTORAL REFORMS

- **Regularized Voter List Updates:** Instead of last-minute surges, continuous registration should be encouraged.
- **Independent Audits:** Third-party verification of voter list changes can build trust.
- **Public Awareness Campaigns:** Educating citizens about voter registration timelines can improve transparency.
- **Technology Integration:** AI and blockchain could be used to track and authenticate voter list modifications.

CONCLUSION

The voter surge in Maharashtra and Delhi aligns with historical trends, suggesting no anomaly. However, variations across States highlight the need for further study into administrative efficiency, demographic shifts, and political influences in voter registration. Strengthening electoral integrity and transparency is essential to maintaining public trust in the democratic process.

TWO DECADES OF INDIA'S PUBLIC SMOKING BAN - CHALLENGES AND PROGRESS

In 1999, Justice K. Narayana Kurup of the Kerala High Court delivered a landmark verdict banning smoking in public places, citing it as a violation of the fundamental right to life under Article 21 of the Constitution. This decision laid the groundwork for the **Cigarettes and Other Tobacco Products Act (COTPA), 2003**, which formally prohibited smoking in public places and introduced penalties for violations.

Two decades later, while progress has been made in reducing public smoking, challenges persist in enforcement, evolving smoking habits, and tobacco-related health risks.

IMPACT OF THE PUBLIC SMOKE BAN

Reduction in Smoking Prevalence

- The **Global Adult Tobacco Survey (GATS) 2016-17** recorded a decline in overall tobacco use from **34.6% (2009-10) to 28.6% (2016-17)**.
- Smoking prevalence among adults also decreased during this period.
- The **National Cancer Registry Programme (NCRP) 2020** estimated that **27.5% of all cancer cases in men** were linked to tobacco use, despite a decline in smoking.

Health Benefits and Risks

- Secondhand smoke exposure has reduced, leading to improved **air quality and better health outcomes** for vulnerable groups.
- However, lung and oral cancers remain among the most common malignancies, indicating **long-term effects of past smoking habits**.
- The **composition of modern cigarettes** has changed, with the addition of new chemicals, potentially altering carcinogenic properties.

CHALLENGES IN ENFORCEMENT

Inconsistent Implementation

- The **Ministry of Health and Family Welfare (MoHFW) Report on Tobacco Control (2022)** highlights **inconsistent enforcement across states**.
- Shops continue to sell **smoking accessories (lighters, matchboxes, etc.)**, triggering relapses in those trying to quit.

Legal Violations

- **Civil society initiatives** report numerous violations, with posters and QR codes used to **report illegal public smoking**.

Societal and Environmental Impact

- **Decrease in cigarette littering**: A reduction in smoking has led to cleaner public spaces.
- **Reduced passive smoking exposure**: Beneficial for children, pregnant women, and the elderly.
- **Continued smoking in private spaces**: Many smokers who previously smoked in public have shifted to private settings, maintaining their **risk of tobacco-related diseases**.

RECOMMENDATIONS FOR STRENGTHENING TOBACCO CONTROL

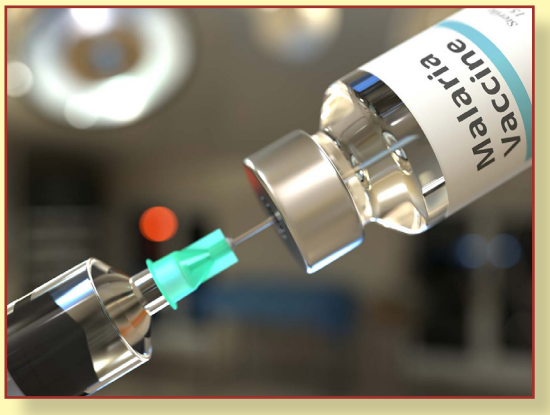
- **Stronger Enforcement Mechanisms**
  - Uniform **state-level implementation** and strict monitoring of violations.
  - Heavier **fines and penalties** for non-compliance.
- **Public Awareness and Education**
  - Expand **anti-smoking campaigns** focusing on the dangers of passive smoking.
  - Promote **smoking cessation programs** at the grassroots level.
- **Regulating Tobacco Products**
  - Research and **restrict harmful additives** in modern cigarettes.
  - Implement **higher taxes on tobacco** to discourage use.
- **Expanding Support for Smokers**
  - Increase access to **rehabilitation centers and helplines** for those willing to quit.
  - Encourage the **development of alternative livelihoods** for those in the tobacco industry.

CONCLUSION

While India's **public smoking ban** has led to **health and environmental benefits**, enforcement challenges persist. A **multi-pronged approach**—focusing on stricter regulation, awareness campaigns, and cessation programs—is crucial for achieving a **tobacco-free society**. As Justice K. Narayana Kurup emphasized, the fight against tobacco must continue **unabated** to ensure **long-term health benefits and policy success**.

CHALLENGES IN MALARIA VACCINATION AND THE ROAD TO ELIMINATION

Malaria remains a major global health challenge, causing over **240 million cases and more than 600,000 deaths annually**. Despite decades of efforts, malaria elimination has proven difficult compared to viral diseases like smallpox and polio. The **World Health Organization (WHO)** recently declared Georgia the **45th country to eliminate malaria**, yet many endemic regions, particularly in Africa and South Asia, continue to struggle with high infection rates.



Unlike viruses, the **Plasmodium parasite** responsible for malaria exhibits **complex genetic adaptability**, allowing it to evade the human immune system and develop resistance to treatments and vaccines. This makes malaria **one of the most challenging infectious diseases to control** through vaccination.

SCIENTIFIC CHALLENGES IN MALARIA VACCINE DEVELOPMENT

The Parasite's Complex Life Cycle

- Malaria is caused by **Plasmodium species** (P. falciparum, P. vivax, P. malariae, P. ovale, and P. knowlesi).
- The parasite has multiple stages—**sporozoite (liver stage), merozoite (blood stage), and gametocyte (mosquito stage)**—each requiring different immune responses.
- Unlike viruses that remain extracellular, **Plasmodium hides within liver cells and red blood cells**, making it difficult for the immune system to detect and destroy it.

Antigenic Variation and Genetic Adaptability

- The parasite frequently **changes its surface proteins**, preventing long-lasting immunity.
- It can **alter its genetic structure** to bypass immunity, rendering existing vaccines less effective.
- This is comparable to a **politician who shifts allegiance and ideology to maintain power**, ensuring its survival for **over 30 million years of evolution**.

AVAILABLE MALARIA VACCINES AND THEIR LIMITATIONS

RTS, S Vacci ne

- The first WHO-approved malaria vaccine, targeting the **liver stage** of the parasite's life cycle.
- **Efficacy:** Reduces malaria cases by **36% after four doses over four years** in children.
- **Limitations:**
  - Significantly lower efficacy compared to vaccines for measles (**90-95%**).
  - Requires multiple doses, posing **logistical challenges** for widespread distribution.
  - **Effectiveness varies** by age group and malaria transmission intensity.

ECONOMIC AND GEOPOLITICAL BARRIER TO MALARIA VACCINATION

- **Underfunding of Research:**
  - Since malaria **primarily affects low-income countries in Africa and South Asia**, global funding for vaccine development remains **low**.
  - Research is costly, and pharmaceutical companies see **low financial returns**, discouraging investments.
- **Reliance on Treatment Instead of Prevention:**
  - Availability of **antimalarial drugs** reduces the urgency for vaccine development.
  - This has led to **delayed progress** in achieving a long-term vaccine solution.
- **Resurgence Due to Climate Change:**
  - Rising temperatures are **expanding mosquito habitats**, increasing malaria transmission in new regions.

THE PATH TO MALARIA ELIMINATION

An effective malaria control strategy requires a **multi-faceted approach**, combining:

- **More Effective Vaccines:** Continued research and funding to improve vaccine efficacy and duration of protection.
- **Integrated Vector Control Strategies:**
  - Genetic engineering of mosquitoes to **reduce malaria transmission**.
  - Widespread use of **insecticide-treated bed nets and indoor spraying**.
- **Improved Treatment and Surveillance:**
  - Rapid diagnostic tests and **early treatment** to prevent severe cases.
  - **Real-time data collection** to monitor and respond to outbreaks.

CONCLUSION

While malaria elimination is achievable, **vaccine development remains a major challenge** due to the parasite's adaptability and the complexity of its life cycle. A **combination of better vaccines, mosquito control strategies, and improved treatments** will be necessary to move closer to a malaria-free world. Sustained investment in research and global commitment to eradication efforts will determine how soon malaria can be eliminated on a larger scale.

ETHICS - CASE STUDY

Q) You are the District Magistrate (DM) of a district where a state highway has become heavily congested due to illegal street vending. The Health Inspectors, tasked with removing these vendors, face significant challenges, including public resistance, political pressure, and humanitarian concerns. Many vendors rely on these stalls for their livelihoods, and sudden eviction could push them into financial distress. At the same time, their presence poses safety hazards, obstructs traffic, and creates sanitation issues.

a. Identify the ethical dilemmas faced by the Health Inspectors and District Administration in this situation.

b. As the District Magistrate, what steps would you take to balance law enforcement, public safety, and the livelihoods of street vendors?

ETHICS - EXAMPLES

1. **Courage of Conviction**: ADGP Kalpana Nayak flagged irregularities in Tamil Nadu's police recruitment process, correcting discrepancies that affected reserved candidates. Shortly after, a fire broke out in her office on July 29, 2024, leading her to suspect foul play, though an official investigation attributed it to a short circuit.
2. **AI Ethics:** The UK will become the first country to criminalise AI tools used to generate child sexual abuse images, banning their creation, possession, and distribution with penalties of up to five years in prison. The law also targets AI-generated "paedophile manuals" and platforms facilitating child abuse content, with offenders facing up to ten years in jail.
3. **Ethics in Governance**: A child's preference for biryani and fried chicken over the standard anganwadi fare in Kerala led Health Minister Veena George to announce a revision of the menu to improve its nutritional value and appeal.
4. **Human Rights**: Indian lawmakers protested in parliament against the deportation of 104 Indian migrants from the U.S., who were allegedly handcuffed and shackled during their flight to Amritsar, with the Indian government engaging with the U.S. to ensure such mistreatment does not happen again.
5. **Technology in Education**: Kerala's KITE(Kerala Infrastructure and Technology for Education) has distributed 29,000 robotic kits to high schools across the state, introducing students to AI, Robotics, and IoT, with support from various corporate donors, and promoting skills like logical thinking and problem-solving through practical projects.
6. **Animal Welfare:** Anoushka Shankar and PETA India donated a mechanical elephant, Kombara Kannan, to the Kombara Sreekrishna Swami Temple to replace live elephants in rituals, promoting animal welfare.
7. **Social Responsibility:** Kudumbashree in Kerala is launching the "Communicore" programme to enhance English competence and digital literacy among children and youth in tribal areas, aiming to improve educational and employment opportunities.
8. **Accountability and Transparency**: The Kerala government has released a 27-page Malayalam 'Citizen's Guide to Budget' for 2025-26, using pie charts and explanations to make revenue collection, expenditure allocation, and budget management easier to understand for the public.
9. **Resilience**: Darpan Inani, India's highest-rated visually impaired chess player and a Chartered Accountant, has overcome immense challenges to achieve national and international success, including two gold medals at the 2023 Para Asian Games.
10. **Environmental Ethics:** Code Effort, founded by brothers Naman and Vipul Gupta, is tackling cigarette stub pollution by recycling them into eco-friendly products like plush toys, cushions, and compost while generating employment for rural women and ragpickers.
11. **Innovation**: Retired IAS officer Kahan Singh Pannu developed the SRB (Seeding of Rice on Beds) technique, reducing water usage in paddy farming by 75% while maintaining yield. His innovation is helping Punjab's farmers cut irrigation costs and conserve groundwater, offering a sustainable solution to the state's looming water crisis.

MODEL ESSAY

"A good head and a good heart are always a formidable combination "

Introduction

- Quote by Nelson Mandela
- **Meaning**: Intelligence (good head) and compassion (good heart) together create a powerful force.
- Importance of a balance between rationality and empathy in leadership, decision-making, and relationships.

Power of Intelligence and Compassion

- Intelligence ensures logical reasoning, problem-solving, and innovation.
- Compassion fosters empathy, ethical decision-making, and social harmony.
- Examples of influential figures who embodied both qualities (e.g., Mahatma Gandhi, Nelson Mandela).

Applications

- Fosters **holistic decision-making** that are both practical and empathetic **Eg**: Sweden's social welfare model
- Leaders who combine intellect with compassion creates a **loyal and motivated community**. **Eg**: Nelson Mandela's leadership during post-apartheid South Africa
- Enhances **social well-being** and help create equitable and inclusive societies **Eg**: India's MGNREGA
- Promotes **Sustainable Development** without sacrificing long-term resources or ethical principles **Eg**: agroecology practices in Costa Rica
- Encourages **personal growth and self-awareness** leading to better emotional intelligence and resilience.
- Strengthens **conflict resolution skills** and find win-win solutions. **Eg:** Good Friday Agreement in Northern Ireland
- Leaders with both a good head and a good heart set ethical examples, **influencing others** to act with integrity and compassion.

Challenges of an Imbalance

- **Ruthlessness Due to Excess Intelligence:** Prioritising efficiency over ethics, leading to exploitative practices. **Eg**: Business leaders engaging in unethical profit-maximisation (corporate fraud cases like Enron).
- **Ineffectiveness Due to Excess Compassion:** Overemphasis on emotions -impractical decisions -lack long-term sustainability. **Eg**: Populist welfare schemes without proper financial planning, leading to economic distress
- **Manipulation and Exploitation:** People with strong emotional tendencies may be taken advantage of by those with strategic intelligence. **Eg**: Charity scams preying on generosity).
- **Paralysis in Decision-Making:** A person torn between logic and emotions may struggle to make firm decisions, leading to delays and inefficiency.
- **Lack of Trust in Leadership:** A leader who is too intellectual may appear cold and disconnected, while one who is overly compassionate may be seen as weak.

Conclusion

- Reiteration of the importance of a good head and a good heart working together - need to cultivate both-for personal growth and societal progress.

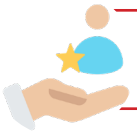
Sample Quotes

- *The two most powerful warriors are patience and time - Leo Tolstoy*
- *You drown not by falling into a river, but by staying submerged in it-Paulo Coelho*
- *Peace cannot be kept by force; it can only be achieved by understanding-Albert Einstein*

MAINS JOT DOWN

GS- II - *INTERNATIONAL RELATIONS*

- The **Ministry of Youth Affairs and Sports** hosted the **first-ever BIMSTEC Youth Summit** in **Gandhinagar, Gujarat**, aimed at strengthening **youth collaboration** and promoting **youth-led initiatives** across the region.
- **BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation)**, established in **1997** with the **Bangkok Declaration**, has its **secretariat in Dhaka, Bangladesh** and comprises **Bangladesh, India, Sri Lanka, Thailand, Myanmar, Nepal, and Bhutan**.
  - » The organization focuses on **economic development, social progress, and regional stability**, with **seven priority areas**: **Trade, Environment & Climate Change, Security, Agriculture & Food Security, People-to-People Contact, Science & Technology, and Connectivity**.



GS- I - *IMPORTANT PERSONALITIES IN NEWS*

- The **Anusandhan National Research Foundation (ANRF)** has launched the **J. C. Bose Grant (JBG)** to honor senior Indian scientists. **Jagadish Chandra Bose (1858–1937)** was a pioneering scientist and the **first Asian to receive a US patent in 1904**.
- He is considered the **father of radio and wireless communication**, having made significant contributions to **radio microwave optics**.
- Bose was also the first to **prove that plants can feel pain and affection**. His key inventions include the **Crescograph**, which measures plant growth, and the **first wireless detection devices**.
- In 1917, he founded the **Bose Institute**, a premier research center. Additionally, he is regarded as the **father of Bengali science fiction**.
- His notable works include *On the Similarity of Responses in Inorganic and Living Matter*, *The Nervous Mechanism of Plants*, and *Niruddesher Kahini* (*The Story of the Missing One*).

GS- II -*GOVERNMENT POLICIES AND INTERVENTIONS*

- The **Union Government** has sanctioned **338 Anganwadi Centres** for upgradation under **Mission Saksham Anganwadi & Poshan 2.0**, led by the **Ministry of Women and Child Development**.
- This **Integrated Nutrition Support Programme** aims to combat **malnutrition** among **children (0-6 years), adolescent girls, pregnant women, and lactating mothers**.
- Its objectives include **improving child nutrition and health**, **reducing mortality, morbidity, and school dropout rates**, and **empowering mothers with nutrition and health education**.

- **Mission Amrit Sarovar**, launched in **2022** under **Azadi Ka Amrit Mahotsav**, has **built or rejuvenated over 68,000 ponds**, addressing water scarcity. The initiative aims to develop **75 Amrit Sarovars per district**, targeting **50,000 nationwide**.
- It integrates schemes like **MGNREGS**, emphasizing **public participation**, with **no separate financial allocation**.

GS- III -*ENVIRONMENT*

- The **Morand-Ganjal Irrigation Project** in Madhya Pradesh involves constructing two dams on the **Morand and Ganjal rivers** to enhance irrigation in **Hoshangabad, Betul, Harda, and Khandwa** districts.
- However, the **National Tiger Conservation Authority (NTCA)** has raised concerns over its impact.
- The project could **displace 644 families**, including **604 tribal families**, and lead to the loss of **over seven lakh trees** at full reservoir level.
- Additionally, it threatens a **critical tiger corridor** between **Satpura and Melghat Tiger Reserves**, putting species like **leopards, wolves, wild dogs, and hyenas** at risk.

GS- III -*DEFENCE*

- The **13th edition of Exercise 'Ekuverin'** between the **Indian Army and the Maldives National Defence Force** has begun in the **Maldives**.
- This **annual bilateral exercise**, held alternately in **India and the Maldives**, aims to **enhance interoperability in counter-insurgency, counter-terrorism, and humanitarian assistance & disaster relief operations**. 'Ekuverin' means **'Friends'** in **Dhivehi**.

- India and Egypt will conduct the **joint military exercise 'Cyclone 2025'** in **Rajasthan** to **strengthen defence cooperation, enhance interoperability, and share special forces expertise in desert warfare**.

GS- III - *POLLUTION*

- India's **first indigenous Automated Biomedical Waste Treatment Rig, 'Sṛjanam'**, developed by **CSIR-NIIST**, was launched at **AIIMS Delhi**. It disinfects **biomedical waste** without the need for incinerators.
- **Biomedical waste** includes waste from **healthcare activities** such as **diagnosis, treatment, and research**.
- India generates **743 tonnes of biomedical waste daily** (CPCB, 2023), necessitating **safe disposal** as per the **Bio-Medical Waste Management Rules, 2016**.

GS- II -*EDUCATION*

- The **Union Minister for Education** recently launched **41 new books** under the **PM YUVA 2.0** scheme. Launched in **2022** by the **Ministry of Education** as part of the **India@75 Project (Azadi Ka Amrit Mahotsav)**, PM YUVA 2.0 is an **Author Mentorship Programme** designed to train young and budding authors **below 30 years of age**.
- The initiative aims to **promote reading, writing, and book culture** in India while also showcasing **Indian literature and heritage on a global platform**. It seeks to nurture a **new generation of writers** who can contribute to literature on **Indian heritage, culture, and knowledge systems**.

GS- I - *ART & CULTURE*

- The **Indian Prime Minister** gifted **Dokra art pieces** to the **French President**. **Dokra artwork**, originating from the **Dhokra Damar tribes** of **Chhattisgarh, Jharkhand, West Bengal, and Odisha**, uses the **lost-wax (cire perdue) metal casting technique**.
- Practiced for over **4,000 years**, its earliest known example is the **Dancing Girl of Mohenjo-daro**. The art draws inspiration from **nature, mythology, and daily life.**

CHERRYPICKS OF THE WEEK

BOMBAY BLOOD GROUP (HH BLOOD GROUP)

- It is an extremely rare blood type, first discovered in **Mumbai in 1952 by Y.M. Bhende**.
- It is unique due to the presence of **anti-A, anti-B, and anti-H antibodies**, which cause agglutination with all ABO blood groups.
- Clinically, individuals with this blood group **cannot receive transfusions from any ABO group, including type O**, as they lack the **H antigen**, which is essential for compatibility.
- As a result, they can **only receive blood from another Bombay blood group donor**, making transfusions highly challenging.

EINSTEIN RING

- It was first discovered in 1987, is a ring of light formed due to strong gravitational lensing around a dark matter structure, galaxy, or galaxy cluster.
- This phenomenon occurs when a massive celestial body bends and amplifies light from distant galaxies in its line of sight.
- The gravitational effects of Einstein Rings help study the Universe's expansion, dark matter, and dark energy.

BIRTH TOURISM

- It is a practice where people travel to another country to give birth to obtain citizenship for their child.
- The main reason for birth tourism is to obtain citizenship for the child in a country with birth right citizenship.
- The child is sometimes called an “anchor baby” if their citizenship is intended to help their parents obtain permanent residency in the country.

EXTENDED REALITY (XR)

- It is a collective term for **immersive technologies** that enhance or simulate reality, including **Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR)**.
  - **Virtual Reality (VR):** Creates a **fully immersive digital environment**, transporting users into a virtual world through **headsets and motion controllers**.
  - **Augmented Reality (AR): Overlays digital elements onto the real world**, enhancing perception without replacing physical surroundings.
  - **Mixed Reality (MR): Integrates real and digital environments**, allowing users to **interact with both seamlessly** in real time.
  - XR is widely used in **gaming, education, healthcare, and industrial applications** to improve engagement and efficiency.

SOVEREIGN GREEN BONDS (SGrBs)

- It was introduced in the Union Budget 2022-23, aim to reduce carbon intensity by funding environmentally sustainable projects.
- Issued by the Union government, these bonds finance initiatives that enhance energy efficiency, cut carbon emissions, boost climate resilience, and protect ecosystems. However, investor interest remains limited due to lower yields.