

CURRENT AFFAIRS

WEEKLY



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- ❑ INDO-US NUCLEAR DEAL
- ❑ TRUMP'S INTEREST IN GREENLAND AND THE PANAMA CANAL
- ❑ DROP IN SCHOOL ENROLMENTS
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- ❑ PRODUCER PRICE INDEX AND ITS IMPACT ON WPI AND CPI
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- ❑ V Narayanan Appointed as the New Head of ISRO
- ❑ Sonobuoys
- ❑ Human metapneumovirus (HMPV)
- ❑ Scientists develop Advanced Injectable Hydrogel for Cancer
- ❑ Cervical Cancer
- ❑ IndiaAI Mission

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DISCLAIMER

The current affairs articles are segregated from prelims and mains perspective, such separation is maintained in terms of structure of articles. Mains articles have more focus on analysis and prelims articles have more focus on facts.

However, this doesn't mean that Mains articles don't cover facts and PT articles can't have analysis. You are suggested to read all of them for all stages of examination.

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SECTION -A

MAINS ISSUES

CISF'S EFFORTS TO REDUCE SUICIDE RATES AMONG ITS PERSONNEL

Context

The **Central Industrial Security Force (CISF)** has successfully reduced suicides among its personnel by **40%** in 2024. According to the **National Crime Records Bureau (NCRB)**, the suicide rate for CISF personnel dropped to **9.87 per lakh** in 2024, compared to the national rate of **12.4 per lakh** in 2022. This marks the first time in five years that the CISF's suicide rate has fallen below the national average.

Reasons for Suicides in CAPFs

Suicides in the **Central Armed Police Forces (CAPFs)**, including the CISF, are driven by multiple factors:

- **Stress** from work-related pressures.
 - **Prolonged separation from family** due to postings in remote areas.
 - **Personal issues** such as family disputes, financial problems, and health issues.
 - **Increasing issues** like online gambling and frauds that push personnel towards extreme actions.
 - **Contributing Factors to Stress and Suicides:** A study conducted by CISF identified the following common causes of stress leading to suicides:
 - ▶ **Nuclear Families:** Lack of emotional support due to smaller family structures.
 - ▶ **Marital Problems:** Marital disagreements and infidelity.
 - ▶ **Technology and Communication:** The faster spread of negative information through smartphones.
- ▶ **High Expectations:** Pressure from family to meet financial and emotional needs.
 - ▶ **Health Issues:** Personnel facing serious illnesses, including cancer, skin diseases, and HIV.
 - ▶ **Isolation:** Loneliness and the inability to share feelings or vent out distress.

Proactive Measures Taken by CISF

The CISF has implemented several measures to address the mental health of its personnel:

- **Commanding Officers' Engagement:** Officers regularly visit posts to communicate with personnel and hold daily "briefing-debriefing" sessions to identify and address signs of distress early.
- **Online Grievance Portal:** A new portal was introduced for personnel to express grievances, allowing senior officers (up to the Director General level) to resolve them quickly. This initiative ensures that issues are addressed promptly, contributing to the overall well-being of personnel.
- **24x7 Mental Health Support:** CISF established round-the-clock tele-counselling services, alongside one-to-one personal counselling. By **September 2024**, over **4,200 personnel** had accessed this mental health support.
- **AIIMS Collaboration for Mental Health Study:** CISF partnered with AIIMS, New Delhi, to conduct a comprehensive mental health study. The findings led to **actionable recommendations** being implemented at the unit level to improve personnel welfare.
- **Improved HR Policies for Work-Life Balance:** CISF recognized that issues like **posting matters** (which affect personal life) were major grievances. A new HR policy was introduced in **December 2024** to offer

choice-based postings. This policy aims to provide a better work-life balance, especially for married couples, women personnel, and those nearing retirement.



FACT BOX

Suicide Rate in India

- India has the dubious distinction of having the highest number of suicides in the world.
- According to a **National Crime Records Bureau (NCRB) report**, 1.71 lakh people died by suicide in 2022 in India.
- The suicide rate has increased to 12.4 per 1,00,000 -- the highest rate ever recorded in India.
- About 50 to 90 per cent of individuals who die by suicide also suffer from mental illnesses such as **depression, anxiety, and bipolar disorder**.
- **Regional Distribution: Maharashtra** reported the highest number of suicides (**22,746**), followed by:
 - ▶ **Tamil Nadu (19,834)**
 - ▶ **Madhya Pradesh (15,386)**
 - ▶ **Karnataka (13,606)**
 - ▶ **Kerala (10,162)**
 - ▶ **Telangana (9,980)**

Initiatives for Suicide Prevention in India

- **National Mental Health Programme (NMHP):** The District Mental Health Programme (DMHP) has been implemented in 738 districts offering services like outpatient counselling, continuing care, and inpatient facilities.
- **National Tele Mental Health Programme:** Launched in 2022, it aims to provide mental health counselling and care nationwide. As of December 2023, 46 Tele MANAS Cells across 34 states/UTs handled over 500,000 calls on their helpline.
- **KIRAN Helpline:** The Ministry of Social Justice and Empowerment launched a 24/7 toll-free helpline called KIRAN, offering mental health support.
- **Ayushman Arogya Mandirs:** Over 1.6 lakh health centres (including Sub-Health Centres (SHCs), Primary Health Centres (PHCs), Urban PHCs, and Urban Health and Wellness Centres (UHCs)) have been upgraded to Ayushman Arogya Mandirs.
 - ▶ Mental health services are included in the Comprehensive Primary Health Care package at these centres.
 - ▶ Guidelines for Mental, Neurological, and Substance Use Disorders (MNS) have been released under Ayushman Bharat.
 - ▶ **Manodarpan Initiative:** Launched under the Atmanirbhar Bharat Abhiyan, the Manodarpan initiative provides psychosocial support for mental health and well-being, particularly during the COVID-19 pandemic.

Legal Aspects Related to Suicide in India

- **Section 309 of the Indian Penal Code (IPC):** This provision criminalizes the attempt to commit suicide, punishable by up to one year of imprisonment or a fine, or both. However, the constitutionality of this provision has been debated, with some courts deeming it unconstitutional.
- **Bharatiya Nyaya Sanhita, 2023 (BNS):** This amendment removes the provision for punishing attempted suicides, aligning with the **Mental Healthcare Act, 2017**. However, the new law retains the provision to punish those who attempt suicide to compel or restrain a public servant from performing their duty.

UPSC PYQ

Q: Explain why suicide among young women is increasing in Indian society. (UPSC 2023)

INDO-US NUCLEAR DEAL

Context

In a landmark development, the United States (US) is set to remove **long-standing regulations that have hindered civil nuclear cooperation** between Indian nuclear entities and US companies. This incremental step, marks a significant stride in operationalising the Indo-US nuclear deal envisioned nearly two decades ago.

Key-highlights

- The Indo-US civilian nuclear deal, initiated in 2008 has remained largely unrealised.
- The deal allowed India to engage in nuclear trade despite not being a signatory to the **Non-Proliferation Treaty (NPT)**.
- The agreement granted India access to nuclear fuel, reactors, and technology for civilian purposes while committing to the separation of its civilian and military nuclear programs under IAEA safeguards.
- Now, the US is finalising steps to remove Indian government entities such as the **Bhabha Atomic Research Centre (BARC), Indira Gandhi Atomic Research Centre (IGCAR), and Indian Rare Earths Limited (IREL)** from the **US Entity List**.
 - ▶ The US Entity List, maintained by the **Bureau of Industry and Security (BIS) of the US Department of Commerce**, restricts foreign individuals, businesses, and organizations deemed a potential threat to US national security or foreign policy interests.

Key Legal Barriers to India-US Nuclear Civil Deal:

- **US Legal Barrier – ‘10CFR810’ Authorization:** Under **Part 810 of Title 10, Code of Federal Regulations (10CFR810)**, the **US Atomic Energy Act of 1954** regulates the export of nuclear technology and materials. This regulation allows US nuclear vendors to export equipment to countries like India, provided strict **safeguards** are followed. However, it **restricts the manufacturing of nuclear equipment** or involvement in **nuclear design work** in the recipient country (India in this case).
 - **Implication for India:** India aims to **co-produce** nuclear components and participate in the manufacturing **value chain** for atomic power projects. The 10CFR810 authorization limits this potential by not allowing Indian manufacturers to play a direct role in building and designing nuclear infrastructure. This is seen as a **major impediment** from India’s perspective, as they seek to advance domestic manufacturing capabilities in nuclear technology.
- **Indian Legal Barrier – Civil Liability for Nuclear Damage Act (2010):** The **Civil Liability for Nuclear Damage Act, 2010** was introduced by India to establish a legal framework for compensating victims of nuclear accidents, outlining procedures for liability and compensation. This act was intended to create a **compensation mechanism** for nuclear accidents, promoting safety and trust in nuclear energy.
 - **Foreign Vendor Concerns:** However, **foreign nuclear suppliers** (such as **GE-Hitachi, Westinghouse, and Areva/Orano**) have raised concerns that the act places **liability for accidents** on equipment suppliers, even if they are not directly responsible for the incident. This has led to hesitation among these companies to invest in India’s nuclear sector due to fears of incurring substantial **future liability** in case of accidents, potentially deterring investment in the country’s nuclear energy projects.

Strategic Importance and the China Angle:

- The **US-India initiative on Critical and Emerging Technologies (iCET)** focuses on deepening cooperation on advanced technologies, including **nuclear technology**. This framework is seen as a possible pathway to resolving the legal barriers that currently exist between India and the US. A **breakthrough agreement** on iCET could pave the way for both countries to **co-manufacture nuclear components** and even **jointly produce** nuclear reactors in India, particularly **small modular reactors (SMRs)**.
- **India’s SMR Ambition:** India is positioning itself as a **manufacturing hub for SMRs**, which are smaller, more cost-effective reactors with capacities ranging from 30MWe to 300MWe. These reactors are seen as an opportunity to **address the growing global demand for nuclear power**, especially in the **Global South**.

- **China’s Position:** **China** has also recognized the **strategic importance** of **SMRs** and is actively investing in the technology, positioning itself as a global leader in the small reactor space. Unlike larger reactors, where China has been a late entrant, SMRs offer a chance for China to compete in the emerging **nuclear energy market**. This competitive scenario places pressure on both India and the US to collaborate to maintain their technological edge and secure a **strong foothold** in the SMR market.

Technological Challenges for India:

- While India has a strong background in **heavy water reactors (PHWRs)**, these reactors use **natural uranium** and are becoming increasingly outdated in comparison to the globally dominant **light water reactors (LWRs)**. The challenge for India is to **upgrade its reactor technology** to align with international standards, primarily driven by the US, Russia, and France.
- **LWR Technology:** The **US, Russia, and France** are global leaders in **LWR technology**, which has become the preferred choice for modern nuclear power plants due to its efficiency and scalability. India’s push to enter the **SMR market** requires overcoming these **technological constraints**, and collaboration with the US could provide a pathway to overcome these hurdles.

TRUMP’S INTEREST IN GREENLAND AND THE PANAMA CANAL

Context

President-elect Donald Trump recently spoke about his interest in securing U.S. control of Greenland and the Panama Canal, and said he would not rule out the use of military force.

Why Would Trump Want to Control Greenland?

Greenland, a semi-autonomous part of Denmark, became strategically important for the U.S. during World War II when the U.S. established its military base, which remains today as Pituffik Space Base.

- **Strategic Location:** Greenland is located between the U.S., Russia, and Europe, making it a key area for defense and economic interests. Its proximity to the Arctic, where shipping routes are opening up due to melting ice, makes it strategically important.
- **National Security:** The U.S. has a military base in Greenland, and Trump believes its location could help protect the free world against rising threats from countries like China and Russia.
- **Resources:** Greenland is rich in natural resources, including oil, natural gas, and rare minerals that are valuable for military technologies and electric vehicle production, resources that are currently sourced from Russia and China.

Why Would Trump Want Control Over the Panama Canal?

Built by the U.S. in the early 20th century, it was handed back to Panama in 1999 after years of tension over its control, with the Panama Canal Authority now managing it.

- **Economic Security:** The Panama Canal is a crucial global trade route that connects the Pacific Ocean to the Caribbean Sea and Atlantic Ocean. About 40% of U.S. container shipping passes through it, making it vital for economic security.
- **Falsely Alleged Chinese Control:** Trump claimed that the Panama Canal is operated by China, a claim disputed by Panama's government. Trump suggested that the U.S. should regain control of the canal to ensure it remains free from Chinese influence.
- **Panama's Sovereignty:** The Panama Canal was handed back to Panama in 1999 after a treaty was signed, and Panama asserts that the canal is under Panamanian sovereignty, which Trump disagreed with, citing its strategic importance for U.S. interests.

DROP IN SCHOOL ENROLMENTS

Context

The **Unified District Information System for Education Plus (UDISE+)** data released by the Ministry of Education (MoE) for **2022-23** and **2023-24** has revealed a **significant decline** in the total student enrolment in schools across India, particularly between **2022-23 and 2023-24**. The figures indicate a drop of **over 1 crore** students (approximately **6%** decline), from **25.18 crore** students in 2022-23 to **24.8 crore** students in 2023-24. This represents a significant decline when compared to the previous years, where enrolment was consistently around **26 crore** students.

Potential Causes of the Drop:

- **Elimination of Duplicate Enrolments:** One of the reasons could be the identification and removal of **duplicate enrolments**, where students who transferred between schools were mistakenly counted multiple times in previous years.
- **Inflated Enrolment Figures:** Previous enrolment numbers may have been **overestimated** due to reporting discrepancies, which is now being corrected by the new methodology.
- **Underreporting or Misreporting:** The drop in enrolment may also reflect the **underreporting or misreporting** of actual student numbers by some schools.
- **School Closures and Mergers:** There has been a noticeable decrease in the number of schools covered under UDISE+, with **87,012 fewer schools** reported in 2023-24 compared to previous years. Most of these schools are government-run, and a large portion of this decline is due to **school closures** or **mergers**, particularly in states like **Jammu and Kashmir, Assam, and Uttar Pradesh**.

Impact of School Closures:

- The closures of schools, particularly in rural and remote areas, may have forced students to either drop out or seek re-admission in nearby schools. The process of seeking re-admission often involves challenges such as **longer travel distances**, which can be a deterrent for parents, especially in areas where infrastructure is lacking.
- This re-admission process may have led to an **increase in dropout rates**, as some parents may not be willing to send their children to distant schools, resulting in students dropping out instead.
- **Regional Impact:** The decline in the number of schools and enrolment has been more prominent in certain states:
 - ▶ **Jammu and Kashmir** experienced the **largest decline**, with **4,509 fewer schools**.
 - ▶ **Assam** saw a reduction of **4,229 schools**, and **Uttar Pradesh** reported a decrease of **2,967 schools**.
 - ▶ Other states like **Madhya Pradesh** and **Maharashtra** also experienced a decrease in the number of schools.

Implications for Education and Policy:

The decline in school enrolment and the number of schools has serious implications for India's education system:

- **Access to Education:** School closures and mergers could affect the accessibility of education for students, particularly in rural and underserved areas. The Right to Education (RTE) Act mandates the availability of primary schools within one kilometer, but these norms may not always be followed during school closures.
- **Quality of Education:** The decrease in the number of schools could also impact the quality of education, especially if students are forced to travel longer distances to access better schools.
- **Government Funding and Schemes:** The reduction in student numbers may also raise questions about the allocation of funds for schemes like **Samagra Shiksha**, which provides financial assistance for various educational purposes. If enrolment figures were inflated previously, the effectiveness of the funding distribution could be questioned.



FACT BOX

About UDISE+

- **Launched in:** 2012-13. From 2018-19 onwards, UDISE became UDISE+.
- UDISE+ is a database on school education from the pre-primary to higher secondary levels.

- The **Ministry of Education** maintains the UDISE+ online platform, through which data on school education is collected from the states.
- It prepares the report based on this data on parameters like **school enrolment, infrastructure, and teachers.**
- This data is key while allocating funds for schemes like **PM-POSHAN (midday meals), Samagra Shiksha, and scholarships.**

Government Educational Initiatives

- **Government Initiatives for Students:** National Education Policy (NEP) 2020, STARS Project, Kala Utsav, Swachh Vidyalaya Abhiyan, Shiksha Parv Initiative, National Means cum Merit Scholarship (NMMS), National Talent Search Exam (NTSE), ISHAN UDAY, Ishan Vikas
- **Government Schemes for Schools:** Mid-Day Meal Scheme, Sarva Shiksha Abhiyan, Institution of Eminence Abhiyan, Higher Education Financing Agency (HEFA), Rashtriya Madhyamik Shiksha Abhiyan, Samagra Shiksha, Eklayva Model Residential Schools, National Achievement Survey, National Curriculum Framework, Rashtriya Avishkar Abhiyan, Padhe Bharat, Badhe Bharat
- **Government Initiatives for Digital Education:** PM E-Vidhya, DIKSHA, National E-library, Swayam Prabha, Swayam, Vidya Daan, E Pathshala, SMART India Hackathon
- **Government Initiatives for Girls:** Beti Bachao, Beti Padhao, Kasturba Gandhi Balika Vidyalaya, National Programme for Education of Girls at Elementary Level (NPEGEL), National Scheme of Incentives to Girls for Secondary Education (NSIGSE), PRAGATI, CBSE Single Child Merit Scholarship, Rani Laxmi Bai Atma Raksha Parikshan
- **Government Initiatives for Disabled Students:** Inclusive Education of the Disabled at the Secondary Stage, International Economic Development Council, SAKSHAM, Identification Camps for CwSN (Children with Special Needs)

- The Act aims to protect citizens' personal data from misuse, ensuring transparency and accountability for organizations handling this data.

Why is the DPDP Act Necessary?

- As more services shift online, **personal data is being increasingly digitized.** While this offers convenience, it also exposes people to the **risk of misuse, such as unauthorized data sharing or cybercrimes.**
- The DPDP Act addresses these issues by enforcing stricter rules on how digital platforms collect, store, and use people's data.

What are the DPDP Rules 2025?

- The DPDP Rules 2025 are the set of regulations developed to help implement the **DPDP Act 2023.**
- These rules provide the detailed processes and mechanisms for ensuring the Act's provisions are properly followed.

Key Features of the Draft DPDP Rules 2025:

- ▶ **Data Protection Board (DPB):** The draft rules outline the framework for setting up the Data Protection Board (DPB). The DPB will be responsible for adjudicating complaints and enforcing penalties related to violations of data protection rules. The DPB will operate digitally, making it easier for people to file complaints and track cases.
- ▶ **Consent Management for Children's Data:** The rules focus on the protection of children's data, requiring entities to obtain verifiable parental consent before processing a child's personal data. This will be enforced through technical and organizational measures.
- ▶ **Cross-border Data Transfer:** The draft rules allow for the transfer of personal data outside India, but only in specific cases approved by the government. The government will decide which data can be transferred and under what circumstances.
- ▶ **Rights of Individuals:** The rules ensure that individuals have control over their personal data. They can withdraw consent, update, or delete their data, and file complaints against entities that misuse their data.
- ▶ **Data Fiduciaries and Consent Managers:** Organizations that collect and process personal data, like social media platforms, e-commerce websites, and online gaming services, are called data fiduciaries. They are required to seek explicit consent from individuals before using their data.
 - ◆ Additionally, consent managers—third-party platforms that help collect and manage consent on behalf of users—are also part of the framework. For instance, platforms that manage financial data and health records may act as consent managers.

DIGITAL PERSONAL DATA PROTECTION (DPDP) RULES 2025 AND THE DPDP ACT 2023

Context

The government floated the draft Digital Personal Data Protection (DPDP) Rules 2025 for public consultation.

What is the DPDP Act 2023?

- The **Digital Personal Data Protection Act (DPDP) 2023** is a law passed by the Indian government to regulate how personal data of individuals is collected, processed, and protected in the digital world.
- The law mandates that companies and organizations (referred to as data fiduciaries) must obtain consent from individuals before collecting their data.

- **Penalties for Violations:** The DPDP Act 2023 provides a penalty mechanism for data fiduciaries who fail to comply with the law. Penalties can be as high as **Rs 250 crore for serious violations**. The severity of the penalty will depend on factors such as the **nature of the violation, efforts made to prevent it, and the duration of the breach**.
- **Exemptions:** Some exemptions apply under the DPDP Act. These exemptions include cases related to law enforcement activities, judicial functions, or performing regulatory functions that require the processing of personal data. Startups or entities engaged in research may also be granted certain relaxations.
- **Filing Complaints:** Citizens who believe their data rights have been violated can file complaints with the **Data Protection Board (DPB)**, which will function digitally. Individuals will be able to file complaints online, and the Board will handle these cases remotely.
- **Timeline for Implementation:** While the DPDP Act 2023 was passed in August 2023, the rules are still under consultation. After the finalization of the rules, the government will take approximately two years to fully implement the Act, giving companies and organizations time to align their systems and processes with the new data protection requirements.

Impact of the DPDP Act:

- The DPDP Act is aimed at improving transparency and accountability for digital platforms. It also gives individuals more control over their data, allowing them to make informed choices about how their personal information is used.
- The law will help safeguard citizens against the misuse of their personal data, whether through cybercrimes, unauthorized sharing, or breaches of privacy.

SLOWDOWN IN GDP GROWTH

Context

India's projected economic growth for **2024-25** has been revised downward to **6.4%**, a significant deceleration compared to the **8.2% growth** achieved in **2023-24**. This marks the lowest growth forecast since the pandemic-induced contraction of **5.8% in 2020-21**.

What's the GDP forecast?

The GDP is essentially the monetary measure of all the goods and services produced within India's borders in a year. It provides the size of the Indian economy. However, in everyday use, it is the "real" GDP that matters. The real GDP is derived by removing the effect of inflation from nominal GDP. The real GDP tells the extent to which India produced more goods and services and it does so by removing the prices at which goods and services are pegged.

- **GDP Growth Estimate:** The National Statistical Office (NSO) released the first advanced estimates for **2024-25**, projecting a **6.4% GDP growth**, down from **7% in**

2023-24 and **8.2% in 2022-23**. The initial forecasts by the RBI and the government had expected growth rates closer to **7%**, but the recent estimates indicate lower-than-expected momentum.

- **Expenditure Side:** The slowdown in growth is largely attributed to a **decrease in investment** rather than consumption. **Private Final Consumption Expenditure (PFCE)** and **Government Final Consumption Expenditure (GFCE)** are expected to show an increase in growth, from **4% to 7.3%** and **2.5% to 4.1%**, respectively. However, **Gross Fixed Capital Formation (GFCF)**, a key indicator of investment, is expected to slow from **9% to 6.4%**.
- **Sectoral Growth:** Growth in the **manufacturing sector** is anticipated to decelerate significantly, with a projected **5.3% growth** in 2024-25 compared to **9.9%** in 2023-24. In contrast, sectors like **agriculture** and **public administration, defense, and other services** are expected to show better growth rates.

Impact on fiscal and monetary policy decisions

- **Impact of Monetary Policy:** Given the slowdown in investment, many economists expect the **RBI** to adopt a more **accommodative stance** on monetary policy, potentially cutting interest rates to support economic activity.
- **Fiscal Policy:** The **Union Budget** will play a crucial role in shaping India's fiscal strategy. While there is a commitment to **fiscal consolidation**, economists expect the government to balance its fiscal targets, including a **4.9% fiscal deficit** for **2024-25**, with the need to stimulate growth amid softer **tax revenues** and **global volatility**.

Challenges:

- **Investment Slowdown:** A slowdown in investment could signal **subdued expectations** for future demand, creating a **vicious cycle** that may further dampen growth prospects.
- **Manufacturing Weakness:** The manufacturing sector, a key engine of economic growth, is facing **significant headwinds**. If this slowdown persists, it could have long-term effects on India's industrial capabilities.
- **Revenue Shortfall:** **Nominal GDP growth** for 2024-25 is expected to be **9.7%**, lower than the **10.5%** assumed in the **2024 Union Budget**. This reduction could lead to a **shortfall in revenue collections**, further complicating fiscal policy.

RBI'S FINANCIAL STABILITY REPORT

Context

India's economic landscape is facing new challenges, particularly in the form of rising household debt and growing retail loan defaults. The latest **Financial Stability Report (FSR)** from the **Reserve Bank of India (RBI)**, released in December 2024, sheds light on these developments, signaling both risks and opportunities for the economy.

Key Findings from the RBI Report

- **Rising Household Debt:** Household debt in India has risen to **43% of GDP** in 2024, up from **35% in 2020**. This growth is primarily driven by **consumption loans** (like personal loans), while loans for asset creation are shrinking.
 - ▶ Economists describe this as a **K-shaped recovery**, where wealthier individuals borrow for assets, while lower-income segments face increasing debt for daily expenses.
- **Retail Loan Stress:** There is growing **stress in retail loans**, especially **unsecured loans**, which are seeing higher **defaults and write-offs**. **Microfinance loans** have also seen rising **delinquency rates**.
 - ▶ While overall **bank NPAs (non-performing assets)** are low at **2.6%**, the RBI's stress tests suggest this could rise to **3% by 2025-26**.
- **Economic Growth and Slowdown:** The economy is experiencing a **cyclical slowdown**, with **GDP growth** forecasted at **6% in 2024-25** and **5.9% in 2025-26**. This is tied to **weak income levels** and **uneven consumption**, reflecting broader household financial stress.
- **Global and Domestic Risks:** **Global uncertainties** (e.g., geopolitical tensions, trade disruptions) pose risks to India's economy. However, the RBI remains confident about the strength of India's **financial system**, with healthy **banking sector fundamentals**.
- **Equity Market and Inflation:** While the Indian **stock market** performed well in 2024, concerns about **high valuations** and **slowing corporate earnings** signal potential risks of a **market correction**.
 - ▶ **Food inflation** and a **weak rupee** against the US dollar are additional risks that could affect consumer prices and overall economic stability.

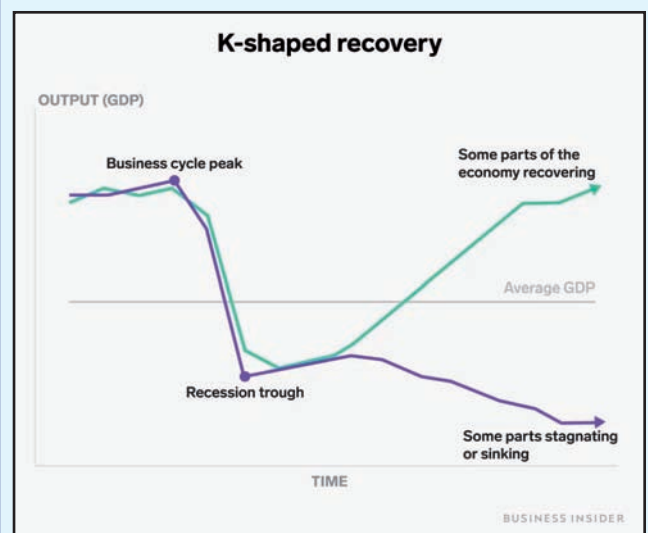
Reserve Bank of India's (RBI) Financial Stability Report (FSR)

- The **Financial Stability Report (FSR)** is a biannual publication (June and December) released by the **Reserve Bank of India (RBI)**.
- It provides a comprehensive assessment of the risks to financial stability in India, evaluating the resilience of the financial system.
- The FSR is based on the collective evaluation of the **Sub-Committee of the Financial Stability and Development Council (FSDC)**, which comprises experts and regulators from various financial institutions.
- **About the Financial Stability and Development Council (FSDC)**
 - ▶ The **FSDC** was established in **2010** under an **Executive Order** by the Ministry of Finance. It was first proposed by the **Raghuram Rajan committee** in **2008** as part of financial sector reforms.

- ▶ **Purpose:** The primary objective of the FSDC is to:
 - ◆ Monitor macroeconomic and financial developments.
 - ◆ Assess risks to financial stability.
 - ◆ Enhance coordination among different financial regulators.
 - ◆ Promote **financial inclusion** and overall development of the financial sector in India.
- ▶ **Composition:** The FSDC is chaired by the **Union Finance Minister** and includes heads of major financial sector regulators:
 - ◆ **RBI (Reserve Bank of India)**
 - ◆ **SEBI (Securities and Exchange Board of India)**
 - ◆ **IRDAI (Insurance Regulatory and Development Authority of India)**
 - ◆ **PFRDA (Pension Fund Regulatory and Development Authority)**
 - ◆ **Chief Economic Adviser (CEA)**, among others.

What is K-shaped recovery?

- The "K-shaped" economic recovery, is characterised by a stark split in the recovery pace of the economy—some sectors are bouncing back ahead of the rest at a much faster pace, while others are continuing a downward trajectory.
- K-shaped recovery occurs if different sectors recover at different rates.
- **Typical economic recoveries** Typical economic recoveries can include Z, V, U, W and L:



- ▶ **V-shaped recovery:** A sharp decline followed by a rapid recovery, with very little time spent at the trough, or low point, of the recession.
- ▶ **U-shaped recovery:** A steep decline followed by a period of time in which the economy sits at the low point of the recession before finally recovering.

- **W-shaped recovery:** Also known as a double-dip recession, this is a scenario when the economy experiences a steep decline, followed by a small and temporary recovery and then a second decline.
- **L-shaped recovery:** A severe recession in which the economy declines and doesn't recover for years, if ever.

PRODUCER PRICE INDEX AND ITS IMPACT ON WPI AND CPI

Context

The Indian government has formed a Working Group to revise the base year of the **Wholesale Price Index (WPI)** and update its commodity basket, alongside the **Producer Price Index (PPI)**. This comes at a time when inflation trends are under scrutiny, and the role of different inflation measures, such as WPI and PPI, is gaining prominence in economic policy discussions.

What is the Producer Price Index (PPI)?

- The Producer Price Index (PPI) measures the average change in prices received by producers for their goods and services over time.
- Unlike WPI, which tracks the prices of goods at the wholesale level, and CPI, which measures inflation at the retail level, PPI focuses on the production stage—specifically what producers (like farmers, manufacturers, and energy producers) receive for their output before goods are sold to wholesalers or consumers.

Key Features of PPI:

- ▶ **Focus on Producers:** PPI tracks price changes at the point where goods and services are produced, either at the factory gate or farm gate, before they reach wholesalers or consumers.
- ▶ **Broader Coverage:** It includes a wide range of sectors such as manufacturing, agriculture, mining, and electricity, giving it a broader scope compared to WPI, which primarily covers goods.
- ▶ **Excludes Taxes:** Unlike CPI, which includes indirect taxes, PPI excludes them to give a true reflection of what producers are paid, without the impact of tax policies.

PPI's Influence on WPI and CPI: The Domino Effect

The PPI plays a critical role in shaping broader inflation trends. Here's how it cascades down through the economy:

- **PPI → WPI:** If producers face higher input costs (for example, higher costs for raw materials like crude oil or steel), they pass these costs on to wholesalers. As a result, the WPI increases, since wholesalers now have to pay more for goods.

- **PPI → CPI:** When wholesale prices rise (as reflected in the WPI), retailers—who purchase goods from wholesalers—raise their prices. This, in turn, leads to higher costs for consumers, thereby causing the CPI to rise.

In simple terms, the PPI acts as the starting point for inflation. It reflects cost pressures on producers, which eventually ripple through to wholesalers (WPI) and then to consumers (CPI). This cycle helps us understand how inflation starts in the production process and impacts both wholesale and retail levels.

Case Study: Real-Life Example: The 2011-12 Crude Oil Price Surge

To better understand how the PPI works, let's look at a real-life scenario.

In 2011-12, there was a significant rise in global crude oil prices. This had a domino effect across various sectors:

- **PPI Impact:** Producers, such as oil refineries in India, faced higher input costs for crude oil. This increased the cost of production for refining and chemical industries.
- **WPI Impact:** As these producers raised their prices, wholesalers faced higher costs for petroleum products like diesel and kerosene. This led to an increase in the Wholesale Price Index (WPI).
- **CPI Impact:** Finally, as wholesalers passed on the increased costs to retailers, consumers experienced higher prices for goods and services, especially those relying on transportation or petroleum-based products, reflected in the Consumer Price Index (CPI).

This shows how an increase in the PPI (reflecting higher input costs for producers) can trickle down, affecting wholesale and retail prices.

PPI vs. WPI: Key Differences

While both PPI and WPI measure price changes at the wholesale level, they differ in the scope and the type of prices they track:

Scope of Coverage:

- ▶ PPI includes a broader range of goods and services, covering both intermediate goods (e.g., raw materials like steel) and final products (e.g., consumer electronics).
- ▶ WPI, on the other hand, mainly tracks wholesale prices of goods and does not include services.

Tax Treatment:

- ▶ PPI excludes indirect taxes (such as GST), which gives a clearer picture of what producers actually receive for their products.
- ▶ WPI includes taxes, making it less reflective of pure producer pricing.

Why is PPI Important?

- PPI provides a more granular view of price movements.
- This helps policymakers and businesses understand inflation from its root cause—price pressures at the production level—rather than just its downstream effects at the consumer level.

Why does India rely on WPI and CPI?

While the PPI offers a deeper insight into inflation at the production stage, India predominantly relies on WPI and CPI for its inflationary measurements. The reasons are as follows:

- **Historical Data:** Both WPI and CPI are long-established indices, and there is ample historical data to compare inflation trends.
- **Ease of Interpretation:** Policymakers, businesses, and the general public are more familiar with the WPI and CPI, making them easier to interpret.

However, economists argue that incorporating PPI more centrally in inflation measurement could enhance policy precision and provide a better understanding of inflationary pressures across different stages of the economy.

How PPI Influences Economic Policy?

The PPI plays an important role in shaping economic policy, especially in the following ways:

- **Monetary Policy:** If the PPI rises (indicating higher input costs for producers), the Reserve Bank of India (RBI) may consider tightening monetary policy (raising interest rates) to control inflation.
- **Industrial Strategy:** If certain sectors (e.g., steel or cement) show a significant rise in PPI, the government may intervene by reducing import duties or offering subsidies to help manage rising costs and protect domestic industries.

Challenges in Adopting PPI in India

Despite its advantages, India does not yet publish a comprehensive PPI and continues to rely on WPI and CPI. Some of the challenges to adopting PPI are:

- **Data Availability:** Collecting comprehensive PPI data across various sectors can be difficult and requires robust infrastructure.
- **Transition Issues:** Moving from a WPI-based system to a PPI-based one would require considerable changes in data collection and interpretation methods.

AMENDMENT OF RULES FOR EXPERTS IN THE GEAC

Context

The **Union Ministry of Environment, Forest, and Climate Change** introduced amendments to the rules governing the selection of experts for the **Genetic Engineering Appraisal Committee (GEAC)**, which is responsible for regulating **genetically modified (GM) seeds** in India. This move follows a Supreme Court directive aimed at addressing

conflicts of interest in the decision-making process regarding GM crops.

Key Changes in the New Rules:

- **Conflict of Interest Disclosure:** The new rules require that expert members disclose any potential conflicts of interest that may arise due to their professional affiliations, associations, or interests. This includes both direct and indirect associations with matters discussed during GEAC meetings.
 - ▶ Experts must take necessary actions to ensure that these interests do not affect the committee's decisions.
- **Recusal Requirement:** If an expert has any direct or indirect connection to a matter being discussed, they are obliged to disclose it before the meeting. Unless the committee specifically requests their participation, the expert is expected to recuse themselves from the meeting.
- **Professional Affiliations Disclosure:** All selected members are required to complete a form detailing their professional affiliations, covering a period of 10 years prior to joining the committee. This measure is aimed at ensuring transparency and accountability in the selection process.
- **Supreme Court Directive:** The amendments align with a **July 2023 Supreme Court order**, which required the Centre to formulate a national policy on GM crops. In the same verdict, the Court issued a **split judgment** on the validity of the **2022 decision** by the Centre to grant conditional approval for the environmental release of **GM mustard** crops. As a result, the final decision on the GM mustard crop was left for a future bench to resolve.

Significance of the Changes:

- **Enhanced Transparency:** The amendments aim to increase transparency and trust in the decision-making process of the GEAC by ensuring that experts with potential conflicts of interest are not involved in relevant discussions and decisions.
- **Regulatory Integrity:** By requiring experts to disclose their professional affiliations and associations, the new rules seek to prevent any undue influence from corporate interests, ensuring that decisions on GM crops are made in the public interest.
- **Compliance with Supreme Court Ruling:** These changes align with the Supreme Court's directions to address concerns of conflict of interest and to ensure a fair and impartial review process for GM crop approvals.



FACT BOX

What are GM Crops?

- Genetically-modified (GM) crops are plants whose DNA has been altered using genetic engineering techniques to introduce desirable traits that do not naturally occur.

- These traits can enhance resistance to pests, diseases, or herbicides, and improve crop yields.
- **GM Crops in India:**
 - ▶ India permits the import of GM soybean and canola oil.
 - ▶ *Bacillus thuringiensis* cotton (Bt cotton) is the only GM crop approved for cultivation in India.
 - ▶ For other GM seeds, India had maintained stringent regulations until recent developments.
- **Genetic Engineering Appraisal Committee (GEAC):** GEAC operates under the **Ministry of Environment, Forest and Climate Change** and is responsible for evaluating and permitting the commercial release of GM crops in India.
 - ▶ It is mandated by the Environment Protection Act 1986.

C. ELEGANS AND ITS ROLE IN SCIENTIFIC DISCOVERIES

Context

Victor Ambros and Gary Ruvkun won the **2024 Nobel Prize in Physiology or Medicine** for discovering **microRNAs** and their role in controlling gene expression. This pioneering discovery was made using the roundworm ***Caenorhabditis elegans***.

Why is *C. elegans* Used in Research?

- The roundworm ***Caenorhabditis elegans* (*C. elegans*)** is a tiny, transparent nematode (worm) about 1 mm long.
- It has become one of the most important organisms for scientific research, especially in understanding **genetics, cell death, aging, and gene expression**.
- The worm's simplicity and transparency make it ideal for studying fundamental biological processes that can be applied to human biology.
- **Beneficial factors for research:**
 - ▶ **Small Size and Simple Anatomy:** The worm has a small body, a transparent exterior, and only 302 neurons (much fewer than humans), which makes it easier to study than more complex animals.
 - ▶ **Short Life Cycle:** *C. elegans* completes its life cycle in about 3.5 days, allowing researchers to observe generations in a short time.
 - ▶ **Simple Organism with Human-Like Features:** Despite its simplicity, *C. elegans* has organ systems similar to humans, making it a model for studying biology that often reveals principles applicable to humans.

Key Discoveries and Contributions

- **Genetic Research:** In the 1960s, scientist Sydney Brenner proposed using *C. elegans* for genetic research. This led to many important discoveries about how genes control development and behavior.
 - ▶ **For example,** Brenner's work showed that genes in *C. elegans* could be mutated, causing changes in how the worm developed, which helped identify key genes involved in growth.
- **Programmed Cell Death:** In the 1970s, John Sulston mapped the development of *C. elegans* cells and found that some cells die at specific points during the worm's growth. This process of "programmed cell death" is controlled by genes.
 - ▶ This finding was important because similar processes occur in humans, especially in the development of fingers, the nervous system, and even in diseases like cancer.
- **Aging:** *C. elegans* has been crucial in understanding how aging works. In the 1980s and 1990s, researchers found genes in *C. elegans* that influence its lifespan.
 - ▶ This led to the discovery that insulin signaling affects aging, a process that is the same in flies, mice, and humans. *C. elegans* is now a key model for studying aging and testing drugs that might extend lifespan.
- **Genome Sequencing:** The genome of *C. elegans* was sequenced in 1998, which was a big milestone in genetics.
 - ▶ This effort provided insights into how genes affect an organism's traits (called phenotypes). The technology developed to sequence the worm's genome helped with the sequencing of the human genome later on.
- **Gene Silencing (RNA Interference):** In 1998, Andrew Fire and Craig Mello discovered RNA interference (RNAi) in *C. elegans*. RNAi is a process where **double-stranded RNA (dsRNA)** can "silence" or turn off specific genes.
 - ▶ This discovery was groundbreaking, as it showed that genes could be controlled directly by RNA, not just by DNA. RNAi has become a crucial tool in research and therapies for diseases like cancer and genetic disorders. For this, **Fire and Mello** won the **Nobel Prize in Medicine in 2006**.
- **Green Fluorescent Protein (GFP):** In 1994, Martin Chalfie introduced GFP from jellyfish into *C. elegans*, which made it possible to track genes and proteins in living organisms. The worm's transparency made it easier to see glowing cells when they were exposed to blue light.
 - ▶ This discovery revolutionized biological research, allowing scientists to study living organisms without killing them. **Chalfie, Shimomura, and Roger Tsien**, who expanded on this research, won the **Nobel Prize in Chemistry in 2008**.
- **MicroRNAs and Gene Regulation:** **Victor Ambros and Gary Ruvkun** made another groundbreaking discovery with *C. elegans*: microRNAs (miRNAs), tiny RNA molecules that control gene expression. In 1990s, Ambros found that the *lin-4* gene produced a small RNA that could regulate another gene, *lin-14*. Ruvkun further showed that these miRNAs are important in regulating the timing of development.
 - ▶ This discovery has deep implications for understanding how genes are turned on and off during development. In **2024, Ambros and Ruvkun**

were awarded the Nobel Prize in Physiology or Medicine for this work.

- **Neural Circuits:** Despite having only 302 neurons, *C. elegans* exhibits complex behaviors. Researchers, such as **John White**, mapped its entire nervous system in the

1980s, creating the first detailed connectome (map of all neural connections). This work helped understand how **neural circuits** function, paving the way for studying behavior and brain function in more complex organisms.



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SECTION - B

QUICK BYTES

TAMIL NADU'S REWARD TO
DECODE INDUS VALLEY SCRIPT

CONTEXT

The Tamil Nadu government has announced a reward of USD 1 million (Rs 8.5 crore) to anyone who can successfully decipher the script of the **Indus Valley Civilisation (IVC)**.

About Indus Valley Civilisation (IVC)

- The Indus Valley Civilisation (IVC) was a **Bronze Age civilization** in the **northwestern regions of South Asia**.
- It lasted from **3300 BCE to 1300 BCE**, and in its mature form from **2600 BCE to 1900 BCE**.
- Together with **ancient Egypt and Mesopotamia**, it was one of three early civilizations of the Near East and South Asia.
- Its sites spanning an area stretching from **northeast Afghanistan, through much of Pakistan, and into western and northwestern India**.
- It flourished in the basins of the **Indus River**. Its major cities were **Harappa and Mohenjodaro**, which housed thousands of inhabitants.
- The Indus civilization is also known as the Harappan Civilisation, after its type site, Harappa, the first of its sites to be excavated early in the 20th century.
- The civilisation was officially discovered in **1921 by John Marshall**, director of the Indian Archaeological Survey.
- Despite its vast size and importance, much about the IVC remains a mystery, including the undeciphered script.

- **The Indus Script:** The IVC script appears on various artefacts like **seal stones, terracotta tablets, and metal objects**. These inscriptions **feature pictograms**, often accompanied by motifs of animals or humans.
 - ▶ **Decoding Efforts:** Over the past century, more than 100 attempts have been made by linguists, archaeologists, and scientists to decode this script. However, no breakthrough has been made, leaving the language of the Indus Valley as one of the most enduring mysteries of ancient civilisations.

The Dravidian Connection:

- Politicians in Tamil Nadu, particularly those from the **Dravidian movement**, have long claimed that the people of the IVC could be the **ancestors of Tamils**. The Indus script might represent an early form of **Dravidian language**, though evidence for this is limited.
- **Dravidian Symbols:** The presence of bulls in the Indus Valley seems to point out that **bulls are a key symbol in Dravidian culture, especially in Tamil Nadu**. There might be a connection between the symbolism of **bulls in the IVC** and the cultural practices in Tamil Nadu, such as the traditional practice of **jallikattu (bull taming)**.
- The Tamil Nadu State Department of Archaeology's recent findings suggest that many of the signs and motifs unearthed in Tamil Nadu resemble those found in the IVC. According to their study, 60% of signs and 90% of drawings found in Tamil Nadu bear similarities to the IVC symbols, suggesting a possible cultural link.
- The origin of the IVC and its relationship to later civilisations, especially the **Aryan migration theory**, is a highly contentious issue.



Figure No. 01

UPSC PYQ

- Q: To what extent was the urban planning and culture of the Indus valley civilization provided inputs to the present-day urbanisation? Discuss. (2014)
- Q: The ancient civilization in the Indian subcontinent differed from those of Egypt, Mesopotamia and Greece in that its cultural traditions have been preserved without a breakdown to the present day. Comment. (2015)

POLAR VORTEX

CONTEXT

A winter storm, caused by the expansion of the polar vortex southwards, hit a large swathe of the country.

What is the Polar Vortex?

- The polar vortex is a large, rotating mass of cold, low-pressure air found around the North and South Poles. It keeps the cold air trapped at the poles. There are two types:
 - Tropospheric Polar Vortex:** It is located in the lower atmosphere (10-15 km high), where most weather events occur.
 - Stratospheric Polar Vortex:** It is found much higher (15-50 km), and is stronger in autumn, disappearing in summer.

Why Did the Winter Storm Happen?

- The winter storm in the US was caused by the expansion of the polar vortex southwards. Normally, the polar vortex stays near the poles, but sometimes, it weakens or shifts, allowing cold Arctic air to move southward. This can lead to extreme cold weather even in areas like Florida.
- Under normal conditions, the jet stream—a **fast-moving air current in the upper atmosphere**—keeps cold air contained in the polar region. The polar vortex helps maintain this jet stream's position. However, when the vortex weakens:
 - The jet stream becomes wavy and unstable.
 - Cold air from the polar vortex can break off and move south, leading to extreme weather, including snowstorms and sub-zero temperatures.
- In this case, the weakening of the vortex allowed extreme cold air to move over a large part of the US, causing dangerous weather conditions like snow, heavy winds, and school closures.

EARTHQUAKE IN TIBET

CONTEXT

A powerful earthquake struck **Tibet near Mount Everest**, causing significant damage. The earthquake, measuring 6.8 in magnitude according to Chinese occurred in **Tingri County**, which is about 80 km north of Mount Everest.

What factors are responsible behind the seismic activity in Tibet?

- Tibet lies at the convergence of **two major tectonic plates**—the **Indian Plate** and the **Eurasian Plate**.
- This convergence is a fundamental factor behind the seismic activity in the region.
- The **Indian Plate is moving northwards and colliding with the Eurasian Plate**, which is pushing the land upwards and creating the **Himalayas**.
- The **ongoing collision** between the Indian and Eurasian plates began around 50-60 million years ago and continues to this day.
- **Impact of the collision**
 - ▶ This collision has created the **Himalayan mountain range**, which is one of the most geologically active regions in the world.
 - ▶ **Tibet Plateau Formation:** This collision also resulted in the rise of the **Tibet Plateau**, often referred to as the **"Roof of the World."** This plateau is the highest and one of the most tectonically active regions on Earth.
 - ▶ The collision results not only in the formation of the Himalayas but also in complex processes like **subduction** (where one plate slides beneath the other) and **slab tear** (where the Indian Plate is slowly peeling apart beneath Tibet). The **slab tear** phenomenon is a particularly critical area of study, as it leads to deep earthquakes in the region, which are harder to predict and more destructive.
- The continuous tectonic forces at work in Tibet generate significant stress within the Earth's crust. This stress often leads to the rupture of geological faults, resulting in earthquakes. The region is crisscrossed with **major fault lines**, where the earth's crust is more prone to breaking and slipping.
- Due to the ongoing tectonic activity, Tibet falls within one of the most **seismically active zones** on Earth. In fact, the Himalayas and the surrounding region are often classified as a **high seismic hazard zone**. This includes areas not only in Tibet but also parts of Nepal, India, Bhutan, and Pakistan.



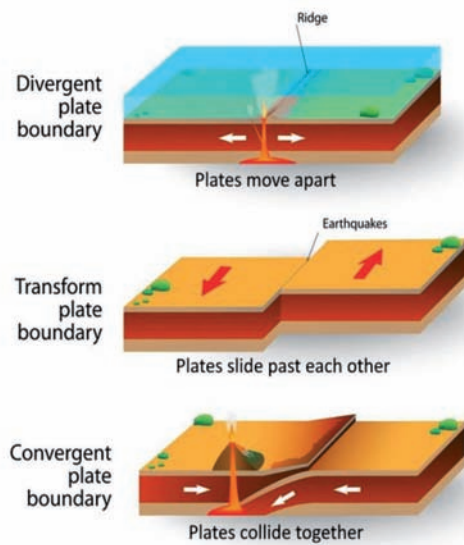
FACT BOX

Plate Tectonics Theory

- The theory of plate tectonics was developed from the 1950s to the 1970s.

- Earth's outer shell is divided into large slabs of solid rock, called **"plates,"** that glide over **Earth's mantle**, the rocky middle layer above Earth's core.
 - ▶ Earth's solid outer layer, which includes the crust and the uppermost mantle, is called the **lithosphere**.
 - ▶ It is between 36 and 87 miles (60 and 140 kilometers) thick.
 - ▶ Below the lithosphere is the **asthenosphere** — a viscous layer kept malleable by heat deep within the Earth.
 - ▶ It lubricates the undersides of Earth's tectonic plates, allowing the lithosphere to move.
- The Earth is composed of a mosaic of thin rigid plates (**pieces of lithosphere**) that move horizontally with respect to one another.
- Plates interact with each other along their **plate boundaries**.
- Plate boundaries associated with tectonic activity (**mountain building, earthquakes, active volcanoes**).
- **Types of Plates**
 - ▶ **Oceanic plates** - plates below the oceans
 - ▶ **Continental plates** - plates below the continents
- The Earth's lithosphere is divided into several large and small tectonic plates that float on the **semi-fluid asthenosphere** beneath them. The movements of these plates are responsible for the creation of geological features such as **mountains, earthquakes, and volcanoes**.
- **Types of plate tectonic boundaries:** There are three kinds of plate tectonic boundaries: **divergent, convergent, and transform plate boundaries**.
 - ▶ **Divergent Plate Boundaries:** A divergent boundary occurs when two tectonic plates **move away** from each other. As the plates separate, magma rises from the Earth's mantle to fill the gap, solidifying to create new crust.
 - ▶ **Convergent Plate Boundaries:** A convergent boundary occurs when two tectonic plates **move towards** each other. The plates can either collide or one plate may subduct (move underneath) the other.
 - ▶ **Transform Plate Boundaries:** A transform boundary occurs when two plates **slide past** each other horizontally. The plates move in opposite directions along a fault, often resulting in earthquakes.

THREE TYPES OF PLATE BOUNDARIES



- ▶ It will benefit tourists and **defense vehicles**, which are vital for the region's security, facilitating their faster movement.

Jammu-Srinagar Highway Four-Laning:

- The project is a **Rs. 16,000-crore initiative** aimed at creating a **four-lane, all-weather road** that reduces the travel time between Jammu and Srinagar. It addresses the region's difficult terrain, including the **Ramban** and **Banihal** areas.
- **Infrastructural Features:** **10 tunnels** (21.5 kilometers in total), **viaducts**, and **bridges** are being constructed to improve connectivity and ensure smoother, safer travel through challenging mountainous areas.
- **Other Projects:**
 - ▶ **Srinagar Semi Ring Road:** Another vital project aimed at reducing traffic congestion in the **Kashmir Valley**, particularly in **Srinagar**. This **Rs. 2,919-crore project** will involve the construction of nearly **300 culverts, flyovers**, and over-road bridges, spanning **60 kilometers** to streamline traffic flow and mitigate flood risks.
 - ▶ **Srinagar-Baramulla-Uri Highway:** The **four-laning** project for this highway is progressing to improve traffic flow and safety between **Srinagar** and **Baramulla**. It includes **bypasses** and **flyovers** to ease congestion, with a **Rs. 823.45 crore** budget.

UPSC PYQ

- Q:** Discuss about the vulnerability of India to earthquake related hazards. Give examples including the salient features of major disasters caused by earthquakes in different parts of India during the last three decades. (2021)
- Q:** The frequency of earthquakes appears to have increased in the Indian subcontinent. However, India's preparedness for mitigating their impact has significant gaps. Discuss various aspects. (2015)

BANIHAL BYPASS

CONTEXT

The newly constructed **2.35-kilometer Banihal bypass**, part of the **Jammu-Srinagar** highway's four-laning project, is set to be operational soon.

About Banihal Bypass and Jammu-Srinagar Highway Project:

- The **2.35 km Banihal Bypass** is part of the four-laning project for the **Jammu-Srinagar National Highway (NH-44)**.
- The bypass bypasses **Banihal town** (a major bottleneck), starting from **Kharpora** and ending near the **Navayuga Tunnel**.
- The design features **four viaducts** (1,513 meters in total) and **three culverts** to ensure smooth traffic flow.
- **Impact on Traffic:** The bypass is expected to reduce congestion, cut down travel time between key locations like **Kharpora, Banihal**, and the **Navayuga Tunnel** to just **7 minutes**.

EPFO 3.0

CONTEXT

The **Employees Provident Fund Organisation (EPFO)** is set to launch its **new software system, EPFO 3.0**, by **June 2025**.

About

- The new system aims to provide **bank-like services** and a **more user-friendly website**.
- The system will also introduce **ATM cards** for EPFO subscribers, improving accessibility and ease of use.
- It is designed to enhance the experience of Employees' Provident Fund (EPF) members.
- It focuses on improving accessibility, streamlining processes and offering new features to offer employees better control over their retirement savings.



FACT BOX

Employees' Provident Fund Organisation (EPFO)

- The **Employees' Provident Fund Organisation (EPFO)**, the administrating body of employees provident fund for both government and private sector.

- It is a **statutory body**.
- EPFO comes under the purview of the **Ministry of Labour and Employment** and was established in **1952**.
- **Schemes Offered Under EPFO:** Given below are the three schemes that are offered under EPFO:
 - ▶ Employees' Provident Funds Scheme 1952 (EPF)
 - ▶ Employees' Pension Scheme 1995 (EPS)
 - ▶ Employees' Deposit Linked Insurance Scheme 1976 (EDLI)
- EPFO ranks among the globe's premier Social Security Organizations, distinguished by its vast clientele and the magnitude of financial transactions it manages.
- At present it maintains **29.88 crore accounts (Annual Report 2022-23)** pertaining to its members.

- **Support for Criminal Investigation:** Bharatpol has **access to 19 Interpol databases**, providing crucial data that helps Indian agencies **analyse crimes, prevent them, and apprehend criminals** more effectively. The portal also simplifies **international criminal investigation** through **Interpol liaison officers (ILOs)** and police officers from central and state agencies.
- **Faster Criminal Extradition:** The portal is expected to significantly expedite cases involving criminals located abroad. Since 2021, nearly **100 criminals** have been **extradited** to India, and **26 fugitives** were successfully brought back in 2024 alone. Bharatpol aims to further streamline this process.
- **Focus on Crime Prevention:** Bharatpol would not only assist in tracking Indian criminals abroad but also help locate international criminals within India. By enabling access to **global crime databases**, it will allow Indian authorities to analyze **global crime trends** and develop frameworks for **preventive actions** before crimes can occur in India.

BHARATPOL

CONTEXT

The Bharatpol portal, launched by Union Home Minister Amit Shah, is an innovative tool designed to streamline and accelerate international law enforcement collaboration, particularly in the Context of transnational crimes like cybercrime, human trafficking, and organized crime.

What is Bharatpol?

- **Developed by: Central Bureau of Investigation (CBI)**
- **Bharatpol is a platform** to strengthen the country's police departments by providing **real-time communication** with **Interpol** and law enforcement agencies worldwide.
- Key Features of Bharatpol:
 - **Real-Time Interface:** The **real-time interface** of Bharatpol is crucial for speeding up responses to **domestic and international requests**. This feature facilitates **faster data sharing**, critical for investigations involving cross-border criminals and fugitive criminals.
 - **Modules of Bharatpol:** The platform incorporates five key modules that provide a comprehensive technological framework for law enforcement agencies:
 - ▶ **Connect:** This module enables Indian law enforcement agencies to function as an extension of **Interpol's National Central Bureau (NCB-New Delhi)**, strengthening international cooperation.
 - ▶ **Interpol Notices:** Simplifies the process of **seeking and offering international assistance** in investigations, ensuring coordination across 195 countries.
 - ▶ **Broadcast:** This ensures immediate availability of assistance requests, streamlining international communication.
 - ▶ **References:** Facilitates sharing critical references related to criminals and crimes across borders.
 - ▶ **Resources:** Aids in managing and exchanging documents and facilitating **capacity-building initiatives** for law enforcement agencies.

PRAVASI BHARATIYA DIVAS (PBD)

CONTEXT

Pravasi Bharatiya Divas (PBD) is celebrated annually on **January 9th** to honor the significant contribution of the **Overseas Indian community** in the development of India.

About the day

- The day marks the return of **Mahatma Gandhi** to India from **South Africa on January 9, 1915**, which was a pivotal moment in India's freedom struggle.
- Gandhi's return is seen as the **beginning of the movement that transformed India**, and celebrating this day recognizes the role of the Indian diaspora in shaping the country's present and future.
- **Role of the Diaspora:** The date also highlights the role of the **Indian diaspora** in India's freedom struggle and their ongoing contribution to the nation's development in the post-independence era. The diaspora has played an integral part in sectors such as business, technology, and policy-making, contributing to India's global stature.
- To mark this day, the tradition of celebrating **Pravasi Bharatiya Divas (PBD)** started in 2003. 1st PBD Convention was organised on 9 January 2003 to mark the contribution of the overseas Indian community to the development of India.
- Since 2015, under a revised format, Pravasi Bharatiya Divas is celebrated once in every two years.
- **18th Pravasi Bharatiya Divas Convention – 2025:**
 - ▶ **Dates:** 08-10 January 2025
 - ▶ **Location:** Bhubaneswar, Odisha
 - ▶ **Theme:** "The Diaspora's Contribution to a Viksit Bharat" (A Developed India). The theme emphasizes the critical role of the Indian diaspora in shaping a prosperous and developed India, highlighting their contributions in various domains like technology, economy, and culture.

GREEN ENERGY OPEN ACCESS RULES, 2022

CONTEXT

The Karnataka High Court struck down the **Green Energy Open Access Rules, 2022** introduced by the Union Government, citing **legislative overreach**. The court ruled that the central government overstepped its authority in framing the rules, as they should have been enacted through **parliamentary legislation** or by state regulatory bodies under the **Electricity Act, 2003**.

Key Points of the Judgment:

- **Violation of Federal Structure:** The court found that the rules infringed on the powers of state regulatory bodies, particularly the **Karnataka Electricity Regulatory Commission (KERC)**, and contradicted the **federal structure** of governance mandated by the Constitution.
- **Legislative Overreach:** The central government could not bypass parliamentary law-making and directly frame such rules. The Electricity Act requires the framing of regulations by **state regulators**, and it was **inconceivable** that the government could sidestep this requirement.
- **Delegation of Legislative Power:** The court highlighted the principle of **legislative delegation** and pointed out that the **Electricity Act** assigns specific roles to various authorities. The central rules, by instructing state commissions to amend their own regulations, encroached upon the independent regulatory functions of the state.



FACT BOX

Green Energy Open Access Rules, 2022

- The **Green Energy Open Access Rules, 2022** were introduced by the Government of India on **June 6, 2022**, to accelerate the country's renewable energy agenda and provide access to **affordable, reliable, sustainable, and green energy** for all.
- These rules are a key component of India's strategy to achieve its **Nationally Determined Contribution (NDC)** target of reducing emissions by 45% by 2030.

Key Objectives and Benefits:

- ▶ **Promotion of Green Energy:** The rules aim to promote the generation, purchase, and consumption of green energy, including energy from **Waste-to-Energy** plants.
- ▶ **Inclusive Access:** The rules allow **any consumer** (including smaller ones) to purchase renewable energy via **open access**. The threshold for open access transactions has been lowered from 1 MW to **100 kW**, enabling small consumers (e.g., small businesses or residential areas) to access green power.

- ▶ **Mandatory Green Energy Supply:** Consumers have the right to demand **green power** from **DISCOMs (Distribution Companies)**, which are obligated to procure and supply this power to eligible consumers.
- ▶ **Streamlined Approval Process:** A simplified, **time-bound approval process** has been introduced. The approval process for green energy open access applications is streamlined through a **national portal**, and approvals must be granted within **15 days** or they will be deemed approved.
- ▶ **Voluntary Adoption for Industries:** Commercial and industrial consumers have the option to **voluntarily** purchase green power at favorable rates.

Features of the Rules:

- ▶ **Open Access for Small Consumers:** The rules lower the open access transaction limit from **1 MW to 100 kW**, enabling smaller consumers to access renewable energy.
- ▶ **Mandatory Green Power Supply:** Consumers are entitled to **demand green power** from their DISCOMs, who are obligated to procure and supply it.
- ▶ **Transparency and Efficiency:** The **approval process** for open access is streamlined with uniformity and transparency. This includes **national-level processing** through the **Green Energy Open Access Registry (GOAR) portal**. All stakeholders can track approvals, rejections, revisions, and curtailments.
- ▶ **Cost Certainty for Consumers:** The rules provide clarity on the **charges** to be levied on green energy consumers, which include transmission, wheeling, cross-subsidy surcharges, standby charges, and others as applicable.
- ▶ **Cross-subsidy and Incentives:** A **cap** is placed on increasing cross-subsidy surcharges and **additional surcharges** are removed to incentivize green energy adoption.
- ▶ **Renewable Purchase Obligations (RPO):** A uniform **RPO** applies to all obligated entities, including the inclusion of **green hydrogen/green ammonia** for fulfilling RPOs.
- ▶ **Green Certificates:** Consumers who purchase green energy are entitled to **Green Certificates**, helping to verify their renewable energy consumption.
- ▶ **Tariff Determination:** The tariff for green energy will be determined by the Appropriate Commission based on the average pooled power purchase cost of renewable energy. This will also account for cross-subsidy charges, if applicable, and the distribution licensee's costs for delivering green power.

- ▶ **Green Energy Open Access Registry (GOAR):** To streamline the process, the Ministry of Power has notified the Grid Controller of India Limited as the Central Nodal Agency to manage the GOAR portal. This portal acts as a single window for all green energy open access applications.

INDIA'S EDUCATION INFRASTRUCTURE GAPS

CONTEXT

The **Union Education Ministry's** data reveals that many schools in India still lack important infrastructure and facilities, affecting education quality.

Key-findings:

- **Access to Technology:** Only 57.2% of schools have functional computers. 53.9% have access to the internet, indicating that many schools still lack digital tools for modern education.
- **Basic Amenities vs Specialized Facilities:** Over 90% of schools have basic amenities like electricity and gender-specific toilets.
 - ▶ However, facilities like functional desktops, internet, and accessibility features (such as ramps for disabled students) are limited:
 - ▶ Only 52.35% of schools have ramps for accessibility, highlighting gaps in infrastructure for differently-abled students.
- **Student Enrollment:** The total student enrollment decreased by 37 lakh, from 25.17 crore in 2022-23 to 24.8 crore in 2023-24.
 - ▶ The **Gross Enrolment Ratio (GER)**, which shows the percentage of students enrolled at each education level, highlights disparities:
 - ◆ Preparatory level (early education): 96.5% GER, showing good enrollment.
 - ◆ Foundational level (primary education): 41.5% GER, showing a large drop in enrollment.
 - ◆ Middle and secondary education: 89.5% and 66.5% GER, respectively, indicating fewer students enrolled at these stages.
- **Dropout Rates:** The dropout rates have risen sharply:
 - ◆ 5.2% dropout rate in middle school.
 - ◆ 10.9% dropout rate in secondary school.
 - ▶ This indicates that a significant number of students are leaving school before completing their education.
- **Challenges Despite NEP, 2020:** The **National Education Policy (NEP) 2020** aims to improve access, equity, and quality of education, but infrastructure gaps like the lack of digital tools and accessibility features remain major challenges.
 - ▶ The education ministry officials highlight that optimizing resources and addressing these infrastructure gaps is crucial to meet the education targets for 2030.



FACT BOX

Government Educational Initiatives

- **Government Initiatives for Students:** National Education Policy (NEP) 2020, STARS Project, Kala Utsav, Swachh Vidyalaya Abhiyan, Shiksha Parv Initiative, National Means cum Merit Scholarship (NMMS), National Talent Search Exam (NTSE), ISHAN UDAY, Ishan Vikas
- **Government Schemes for Schools:** Mid-Day Meal Scheme, Sarva Shiksha Abhiyan, Institution of Eminence Abhiyan, Higher Education Financing Agency (HEFA), Rashtriya Madhyamik Shiksha Abhiyan, Samagra Shiksha, Eklayva Model Residential Schools, National Achievement Survey, National Curriculum Framework, Rashtriya Avishkar Abhiyan, Padhe Bharat, Badhe Bharat
- **Government Initiatives for Digital Education:** PM E-Vidhya, DIKSHA, National E-library, Swayam Prabha, Swayam, Vidya Daan, E Pathshala, SMART India Hackathon
- **Government Initiatives for Girls:** Beti Bachao, Beti Padhao, Kasturba Gandhi Balika Vidyalaya, National Programme for Education of Girls at Elementary Level (NPEGEL), National Scheme of Incentives to Girls for Secondary Education (NSIGSE), PRAGATI, CBSE Single Child Merit Scholarship, Rani Laxmi Bai Atma Raksha Parikshan
- **Government Initiatives for Disabled Students:** Inclusive Education of the Disabled at the Secondary Stage, International Economic Development Council, SAKSHAM, Identification Camps for CwSN (Children with Special Needs)

FRONT-RUNNING

CONTEXT

The **Securities & Exchange Board of India (SEBI)** has unearthed a front-running scam in the Indian securities market and in an interim order, debarred 22 entities.

What is Front-Running?

- Front-running is an **illegal practice** in financial markets where an individual or entity trades a security based on **advanced knowledge of a forthcoming large trade** that is likely to affect the price of the security.
- The person who engages in front-running uses this **privileged information**, typically obtained through their position in a financial institution, to make a profit before the original trade is executed.
- The concept of front-running is primarily seen in situations involving large institutional trades, such as **mutual funds, pension funds, or hedge funds**, where the size of the trade can significantly influence the market price of a stock, especially if the stock is less liquid.

- Front-running is **illegal because it is based on insider information**—information that is not available to the general public. This unfair advantage allows the person who knows about the trade to exploit it for personal gain before the market reacts to the institutional trade.
- The **Securities and Exchange Board of India (Sebi)** uses various **algorithms, data analytics, and supervision technology** to track instances of front-running and insider trading.

PANEL TO REVISE WPI AND DEVELOP PPI

CONTEXT

The Government of India announced the formation of an **expert panel** tasked with revising the country's **Wholesale Price Index (WPI)**, in light of the **structural changes in the economy** that have occurred between the current base year of **2011-12** and the proposed new base year of **2022-23**. Additionally, the panel will focus on developing the **Producers' Price Index (PPI)**, a key price gauge that has been approved by the **Technical Advisory Panel on Statistics of Prices and Cost of Living**.

Key Objectives of the Expert Panel

- The panel will be led by **Ramesh Chand**, Member of **NITI Aayog**.
- **Revising the WPI:** The WPI, which reflects the price changes at the wholesale level, will be updated to better reflect the economic changes over the past decade. This revision will ensure the index remains relevant in tracking price trends in India's evolving economy.
- **Developing the PPI:** A new **Producers' Price Index (PPI)** will be formulated to measure the average change in the prices that domestic producers receive for their goods and services. The panel will also evaluate the methodology and composition for compiling this index.



FACT BOX

Wholesale Price Index (WPI)

- The WPI is a **crucial economic indicator** that measures the average change in the prices of goods traded between businesses at the wholesale level, before they reach the retail market.
 - ▶ It is an important tool for assessing inflationary trends at the producer level, helping to understand price changes in the economy from the perspective of producers rather than consumers.
 - ▶ The WPI is calculated by the **Office of the Economic Adviser (OEA)**, which is part of the **Ministry of Commerce and Industry**.
 - ▶ It is released on a regular basis to provide insights into inflation trends and the cost of production in the economy.

- **Composition of WPI:** The index is divided into three major categories:
 - ▶ **Primary Articles:** This category includes agricultural products such as food, vegetables, fruits, and raw materials.
 - ▶ **Fuel and Power:** This category includes energy-related products like crude oil, natural gas, coal, and electricity.
 - ▶ **Manufactured Products:** This category covers goods that are produced in factories, such as machinery, chemicals, and textiles.
- The weightage of each category is determined based on its relative importance to the economy.
- **Comparison with CPI:**
 - ▶ While the **Consumer Price Index (CPI)** tracks price changes experienced by **consumers** at the retail level, the WPI focuses on the **producer side** of the economy.
 - ▶ WPI is more relevant for tracking the cost of goods at the **wholesale** level, whereas CPI reflects how price changes affect consumers directly through the prices they pay at stores.

Limitations of WPI:

- The WPI primarily focuses on **goods**, and may not fully capture the price changes in the **services sector**, which is growing significantly in the modern economy.
- As the services sector increasingly contributes to economic growth, the absence of service-based price indicators in the WPI can limit its comprehensive representation of inflation.

V NARAYANAN APPOINTED AS THE NEW HEAD OF ISRO

CONTEXT

V Narayanan has been appointed as the **new head of the Indian Space Research Organisation (ISRO)**. He will take over from **S Somanath**, who served as the ISRO chairman from 2022.

Important Contributions

- **Joined ISRO in 1984:** With nearly four decades of experience in space technology, Narayanan began his career at ISRO in 1984.
- His early contributions were in the **Solid Propulsion area**, specifically with **Sounding Rockets, Augmented Satellite Launch Vehicles (ASLV), and Polar Satellite Launch Vehicles (PSLV)** at the Vikram Sarabhai Space Centre (VSSC).
- **Shift to Cryogenic Propulsion:** In 1989, Narayanan transitioned to the **Cryogenic Propulsion area** at the **Liquid Propulsion Systems Centre (LPSC)**. This was a pivotal shift in his career, leading to crucial advancements in the propulsion systems used in space launches.

- **Leadership at LPSC:**
 - ▶ **Director of LPSC (2018):** Under his leadership, LPSC developed **164 liquid propulsion systems** for **41 launch vehicles** and supported **31 spacecraft missions**.
 - ▶ **GSLV Mk III & C25 Cryogenic Project:** Narayanan was the Project Director for the **C25 Cryogenic Project**, which developed the **C25 Stage** — a critical component for the **GSLV Mk III** vehicle, a significant achievement for ISRO’s rocket capabilities.
- **Expertise:** Narayanan is widely recognized for his expertise in **rocket propulsion** and **spacecraft propulsion systems**, both of which are critical for ISRO’s mission success.

Important Concepts

- **Solid Propulsion:** Solid propulsion refers to a type of rocket engine where the propellant is in solid form. These engines are widely used in space missions for their simplicity and reliability. Narayanan’s early work at ISRO involved **Sounding Rockets, Augmented Satellite Launch Vehicles (ASLV), and Polar Satellite Launch Vehicles (PSLV)**, all of which utilized solid propulsion systems for their launches.
- **Cryogenic Propulsion:** Cryogenic propulsion involves the use of **cryogenic fuels** (fuels that are stored at very low temperatures, such as liquid oxygen and liquid hydrogen) to power rockets. These engines are more efficient, providing greater thrust and performance, making them essential for heavier payloads and more complex space missions.
- **Liquid Propulsion Systems Centre (LPSC):** The Liquid Propulsion Systems Centre (LPSC) is a major ISRO facility responsible for the development of liquid propulsion systems for rockets and spacecraft. These systems are used for precise maneuvering, orbit insertion, and boosting rocket stages during missions.
- **GSLV Mk III (Geosynchronous Satellite Launch Vehicle Mark III):** The Geosynchronous Satellite Launch Vehicle Mark III (GSLV Mk III), also referred to as the Launch Vehicle Mark 3 (LVM3), is a three-stage, medium-lift launch vehicle developed by ISRO. The three stages of the LVM3:
 - ▶ two solid strap-on motors (S200)
 - ▶ one liquid core stage
 - ▶ A high-thrust cryogenic upper stage makes up the LVM3
- **Rocket propulsion:** It refers to the technology used to propel rockets into space, while spacecraft propulsion deals with the systems that control the movement of spacecraft once they are in orbit or in deep space. Both are critical to ensuring the success of space missions by providing the necessary thrust and enabling fine control during flight.

SONOBUOYS

CONTEXT

India and the U.S. have announced a significant collaboration aimed at enhancing **Undersea Domain Awareness (UDA)** for the **Indian Navy** through the co-production of **U.S. sonobuoys**. This collaboration is the latest in a series of defense technology partnerships between the two countries, responding to growing concerns over **China’s expanding naval presence in the Indian Ocean Region (IOR)**.

Key Highlights:

- **Partnership Development:** The **Ultra Maritime (UM)**, a U.S.-based leader in **undersea warfare capabilities**, and **Bharat Dynamics Limited (BDL)**, an Indian state-owned defense company, will co-produce sonobuoys for the Indian Navy.
- The project is aligned with the **U.S.-India Initiative on Critical and Emerging Technologies (ICET)**, launched in May 2022, and will adhere to **“Make in India”** principles by manufacturing these sonobuoys both in the U.S. and India.
- **Technology Focus:** The collaboration will focus on developing **sonobuoy technologies** tailored for the unique acoustic environment of the **Indian Ocean**. This will include solutions for **wide-area search** and **multi-static active solutions**, enhancing the ability to detect submarines and underwater threats.
- The **sonobuoys** produced under this partnership will be designed for **interoperability**, allowing them to be used seamlessly by the **U.S. Navy**, the **Indian Navy**, and other allied countries’ naval assets, including **P-8, MH-60R, and MQ-9B Sea Guardian** aircraft.
- While India already operates the **American sonobuoys from the P-8I maritime surveillance and anti-submarine warfare aircraft**, the fresh deal is for the **MH-60 Romeo helicopters**, also procured from the US.
- The sonobuoys are a mix of active and passive capabilities, and are expendable, meaning they are meant for use only once.
- Use of sonobuoys would make these aircraft more potent in carrying out anti-submarine warfare as they raise the probability of detection of enemy submarines.
- There are three types of sonobuoys the Indian Navy is procuring:
 - ▶ AN/SSQ-53G high-altitude anti-submarine warfare (HAASW) sonobuoys
 - ▶ AN/SSQ-62F HAASW
 - ▶ AN/SSQ-36



FACT BOX

About Sonobuoys

- Sonobuoys are **advanced devices** that play a critical role in **tracking submarines and monitoring underwater activity**, particularly in deep seas and oceans.

- Sonobuoys are **expendable, electro-mechanical acoustic sensors** that **relay underwater sounds** emitted from ships and submarines.
- They remain active for **about 24 hours** and help in detection, classification and prosecution of adversarial ships and submarines.
- A **naval helicopter or fixed-wing aircraft** generally drops sonobuoys in a pattern.
- They are dropped in canisters and are deployed automatically upon impact with water.
- An **inflatable system** with a **radio transmitter** remains on the surface for communication with the ship or aircraft tracking it while sensors descend below the surface to predetermined depth.
- It then relays acoustic information back to those monitoring them. A group of sonobuoys deployed in a pattern can find out the exact location of the submarine which then can be tracked by other systems.

HUMAN METAPNEUMOVIRUS (HMPV)

CONTEXT

India has reported five cases of **Human Metapneumovirus (HMPV)**, with two each in Karnataka and Tamil Nadu, and one in Ahmedabad.

What is HMPV?

- HMPV, a respiratory virus first identified in 2001, is already in global circulation, including India.
- Human metapneumovirus (HMPV) is a **negative-sense single-stranded RNA virus** belonging to the Pneumoviridae family and closely related to the **Avian metapneumovirus (AMPV) subgroup C**.
- It was first identified in 2001 in the Netherlands using **RNA arbitrarily primed PCR (RAP-PCR)**.
- The virus primarily affects the **respiratory system** and tends to be more active during late winter and spring, overlapping with influenza and RSV seasons.
- Recently, HMPV has made headlines due to rising infections in China and concerns over its potential to spread further.
- **Symptoms:** HMPV typically affects the respiratory system, with common symptoms including **sore throat, fever, nasal congestion, cough, and shortness of breath**. In severe cases, it can lead to **pneumonia or bronchiolitis**, requiring hospitalisation and oxygen therapy.
- **Common similarities:** While HMPV shares similarities with other respiratory viruses like the flu or RSV (Respiratory Syncytial Virus), it can cause more severe symptoms in vulnerable populations, such as infants, older adults, and those with weakened immune systems.

SCIENTISTS DEVELOP ADVANCED INJECTABLE HYDROGEL FOR CANCER

CONTEXT

In a significant breakthrough in cancer therapy, researchers from the **Indian Institute of Technology-Guwahati (IIT-G)** and the **Bose Institute, Kolkata** have developed a **revolutionary injectable hydrogel** designed to deliver anti-cancer drugs directly to tumour sites, offering a safer and more effective alternative to traditional chemotherapy and surgery.

Key Features of the Hydrogel

- The hydrogel acts as a **stable reservoir for anti-cancer drugs**, releasing the medication in a controlled manner while minimizing damage to healthy cells.
- This localized drug delivery system addresses significant limitations of conventional cancer treatments, such as **chemotherapy** and **surgical interventions**, which often harm healthy tissues or may not be feasible for certain tumours.
- Hydrogels are **water-based, three-dimensional polymer networks** that can absorb and retain fluids. Their unique structure mimics living tissues, making them ideal for **biomedical applications**.
- The hydrogel developed by the researchers is composed of **ultra-short peptides**, which are **biocompatible** and **biodegradable**.
- These peptides ensure that the hydrogel remains localized at the injection site, avoiding systemic circulation.
- **Mechanism of Action:** What sets this hydrogel apart is its ability to **respond to elevated levels of glutathione (GSH)**, a molecule typically abundant in tumour cells. When the hydrogel encounters these high GSH levels, it triggers a **controlled release of the anti-cancer drug** directly into the tumour. This mechanism significantly reduces side effects associated with chemotherapy, which can impact healthy tissues throughout the body.
- **Benefits Over Traditional Treatments**
 - **Precision Delivery:** The hydrogel ensures that the drug is released directly into the tumour, avoiding healthy cells.
 - **Minimized Side Effects:** By targeting only the tumour cells, the hydrogel reduces the systemic side effects commonly seen with chemotherapy, such as nausea, fatigue, and immune suppression.
 - **Enhanced Drug Uptake:** Studies showed that the hydrogel improves drug uptake by cancer cells, inducing **cell cycle arrest** and promoting **programmed cell death (apoptosis)**, which helps in attacking tumours from multiple fronts.

CERVICAL CANCER

CONTEXT

January is **Cervical Cancer Awareness Month**. It is a perfect opportunity for WHO and partners to raise awareness about cervical cancer and HPV vaccination.

What is Cervical Cancer?

- Cervical cancer is a type of cancer that occurs in the cells of the **cervix**- the lower part of the uterus that connects to the vagina.
- **Caused by:** The primary cause is the Human Papillomavirus (HPV), a dangerous virus. The majority of cases of cervical cancer (99%) are associated with HPV infection.
 - ▶ **Other risk factors:** Multiple sexual partners, starting the journey into sexual activity at a young age heightens vulnerability, infections like **chlamydia, gonorrhea, syphilis**, and **HIV/AIDS** can increase the risk, and smoking can also elevated risk of cervical cancer.
- **Symptoms:** Although most infections with HPV resolve spontaneously and cause no symptoms, persistent infection can cause cervical cancer in women.
- **Prevention: Effective primary (HPV vaccination) and secondary prevention approaches** (screening for, and treating precancerous lesions) will prevent most cervical cancer cases.
- **Cervical Cancer Types**
 - ▶ **Squamous cell carcinoma:** This forms in the lining of your cervix. It's found in up to 90% of cases.
 - ▶ **Adenocarcinoma:** This forms in the cells that produce mucus.
 - ▶ **Mixed carcinoma:** This has features of the two other types.

HPV

- HPV is an extremely common virus transmitted through sexual contact.
- It is complicated by the fact that it can last for years, causing changes in cervical cells over time and ultimately opening the door for cancer.
- **HPV Vaccine:** The HPV vaccine can prevent most cases of cervical cancer if the vaccine is given before girls or women are exposed to the virus.
 - ▶ **Quadrivalent vaccine (Gardasil):** It protects against four types of HPV (HPV 16, 18, 6 and 11). The latter two strains cause genital warts.
 - ▶ **Bivalent vaccine (Cervarix):** It protects against HPV 16 and 18 only.
 - ▶ **Non-valent vaccine (Gardasil 9):** It protects against nine strains of HPV.

India-made vaccine

Cervavac (quadrivalent): This is India's first indigenous HPV vaccine, launched in January 2023, It has been developed and manufactured by **Pune-based Serum Institute of India (SII)**. It targets the same four HPV types as Gardasil.

INDIAAI MISSION

CONTEXT

The Union government of India is taking steps to regulate **artificial intelligence (AI)** and ensure its safe and effective governance. A government panel, under the **IndiaAI Mission**, has proposed guidelines to manage AI's growing impact across various sectors. These guidelines emphasize the creation of a **coordinated approach** to oversee AI's evolution and ensure compliance across the country.

Key Recommendations:

- **Inter-Ministerial AI Coordination Committee:** The report suggests setting up a committee to ensure all government departments work together effectively on AI policies and regulations.
- **Technical Secretariat:** The Ministry of Electronics and Information Technology (IT) should house a technical unit that brings in experts from various departments to pool knowledge and assess AI-related risks.
- **Principles for AI Governance:** The guidelines propose several principles to govern AI in India, including:
 - ▶ **Transparency:** AI systems should be clear in their development and capabilities.
 - ▶ **Accountability:** Developers and users of AI systems must be accountable.
 - ▶ **Safety and Reliability:** AI systems must be robust and safe by design.
 - ▶ **Privacy and Security:** AI systems must ensure privacy and security.
 - ▶ **Fairness and Non-Discrimination:** AI must be inclusive and fair, avoiding bias.
 - ▶ **Human-Centered Values:** The design and use of AI should prioritize human well-being.
 - ▶ **Sustainability:** AI innovation should benefit everyone equitably.
- **Life Cycle Approach:** The guidelines stress that AI policies should consider all stages of AI development—design, deployment, and diffusion. Risks at each stage must be addressed carefully.
- **Ecosystem Approach:** All stakeholders involved in AI—data providers, developers, deployers, and end-users—must be considered when forming regulations.
- **Self-Regulation in AI Sector:** The report encourages AI developers and deployers to regulate themselves, minimizing government intervention while promoting responsible AI use. It emphasizes applying existing laws to handle risks like cybersecurity and deepfakes, rather than introducing new laws.

- **Technology-Enabled Governance:** Instead of strict oversight, the panel proposes a digital governance system, using tech to manage risks and gradually scale up regulatory measures as the AI space grows.
- **Promoting Beneficial AI Use:** The report aims to create a supportive policy environment for AI that fosters responsible applications, reduces risks, and fills regulatory gaps.

IndiaAI Mission

- IndiaAI mission is a comprehensive national-level mission.

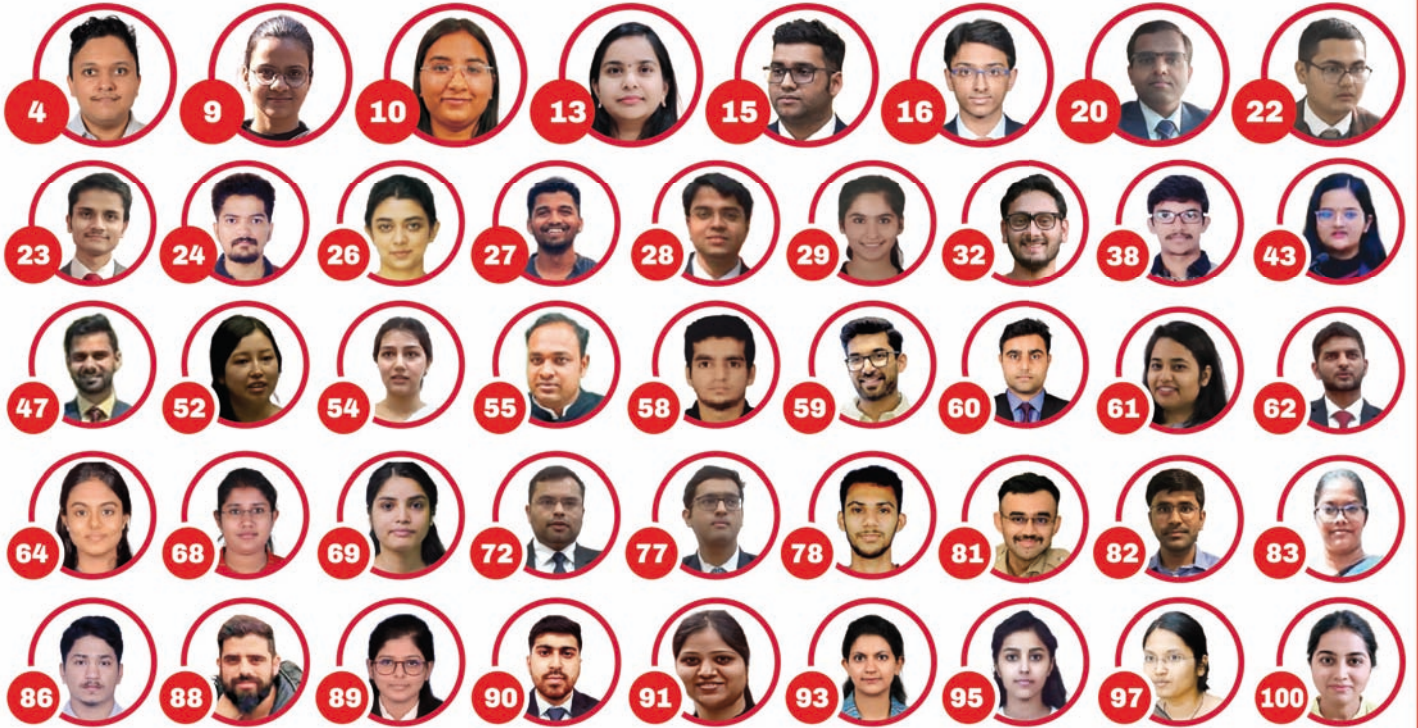
- The IndiaAI mission aims to establish a comprehensive ecosystem catalyzing AI innovation through strategic programs and partnerships across the public and private sectors.
- **Components of the mission:** IndiaAI Compute Capacity, IndiaAI Innovation Centre, IndiaAI Datasets Platform, IndiaAI Application Development Initiative, IndiaAI FutureSkills, IndiaAI Startup Financing, and Safe & Trusted AI.
- The Mission is implemented by '**IndiaAI**' **Independent Business Division (IBD)** under **Digital India Corporation (DIC)**.





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