

January Current Affairs – 2025

Geography

National Critical Mineral Mission

- ❖ Union Cabinet has approved the **National Critical Mineral Mission (NCMM)** with an expenditure of ₹34,300 crore to strengthen India's critical mineral value chain.

About National Critical Mineral Mission

Features of NCMM

- **Aimed at Innovation:** Promote research in **advanced mineral processing & cutting-edge technologies** for mineral processing and recovery and establish **Centers of Excellence**.
- **Comprehensive Mineral Value Chain:** Encourages **both public & private investment** in global mining projects encompassing exploration, mining, beneficiation, processing & recycling of critical minerals.
- **Financial Support:** ₹16,300 cr. from govt for exploration and recovery of minerals through subsidies and grants & ₹18,000 cr. expected investment from PSUs & private companies.
- **Infrastructure Development:** Establishment of **mineral processing parks** and promotion of **critical mineral recycling**.
- **Stockpile Strategy:** Plans to build a **national reserve** of critical minerals to ensure long-term supply security.
- **Faster Regulatory Approvals** for critical mineral mining projects to ensure smooth operations.
- **Self-Reliance in Critical Minerals:** Reduce dependence on imports by enhancing domestic production and acquiring foreign assets.

Critical Minerals Under NCMM

- **Lithium & Cobalt:** Essential for electric vehicle (EV) batteries and electronics.
- **Graphite & Nickel:** Used in battery storage and alloys.
- **Rare Earth Elements (REEs):** Key for high-tech manufacturing and defense applications.
- **Titanium & Tungsten:** Critical for aerospace and industrial applications.
- **Vanadium & Molybdenum:** Used in steel production and energy storage solutions.

Technological and Legislative Support

- Mines and Minerals (Development and Regulation) Act, 1957: The 2023 amendments enhance exploration and mining of critical minerals.
- **Geological Survey of India (GSI):** Conducting large-scale exploration projects for critical minerals, with 368 projects ongoing.
- **S&T PRISM Program:** Encourages start-ups and MSMEs in mineral research and commercialization.
- **KABIL's Foreign Acquisitions:** KABIL, a JV of the Ministry of Mines, has secured mining rights in Argentina for Lithium.

Critical Minerals

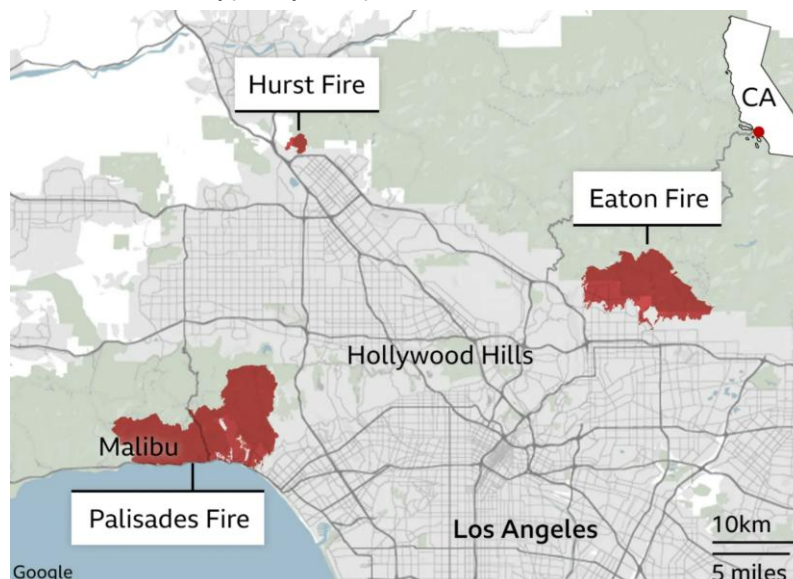
- A **critical mineral** is a **metallic or non-metallic element** crucial for modern technologies, economies, and national security, with the potential risk of disruptions to its supply chains. It includes both **primary and processed minerals**.
- A mineral is critical when the **risk of supply shortage** and **associated economic impact** is (relatively) higher than other raw materials.
- **Countries create their own critical minerals list** based on strategic needs.
- These are minerals that are essential for **economic development** and **national security**.
- The lack of availability of these minerals or the concentration of extraction or processing in a few geographical locations can lead to **“supply chain vulnerabilities and even disruption of supplies”**.

Critical Minerals of India

- GoI has unveiled the **country’s first report on “Critical Minerals for India”** and has identified **30 critical minerals**, including nickel, **titanium, vanadium, tungsten, etc.**
- The identification of the critical minerals is a part of multiple **strategic value chains**, which include:
 - ❖ **Clean technologies initiatives** (such as zero-emission vehicles, wind turbines, and solar panels);
 - ❖ **Information and communication technologies** (including semiconductors);
 - ❖ **Advanced manufacturing inputs and materials** (defence applications, permanent magnets, & ceramics).
- The minerals were identified based on a report by an Expert Committee of the **Ministry of Mines**.

California Fires

- ❖ The **Los Angeles area** is experiencing unprecedented **winter wildfires**, including the **Palisades fire** (largest and most destructive), **Eaton fire**, **Sunset fire**, **Hurst fire**, and **Lidia fire**.
- While California frequently battles wildfires, this particular flare-up is notable for its size, speed, and unusual timing—**occurring in the winter**, a season typically less prone to wildfires.



Causes of the Winter Wildfires

Weather Pattern Dynamics

- **Previous Years:** Unusually wet winters led to extensive vegetation growth.
- **Current Winter (2023-2024):** Exceptionally **dry** conditions (according to NASA, since October, Southern California has recorded **negligible rainfall**) have turned this vegetation into **fuel**.

Santa Ana Winds

- The **Santa Ana winds** (strong, **dry**, and **hot katabatic** wind), a typical feature of California's climate, significantly fanned the flames.
- Between October and January, a **high-pressure system** develops over the **Great Basin deserts**, causing winds to **blow westward** towards the coast.
- As these winds descend over the **Sierra Nevada** and **Santa Ana mountains**, they **lose humidity** (descending winds undergo compression → temperature rises → reduces humidity), heat up, and accelerate as they pass through mountain gaps. When they reach Southern California, the winds are fast, dry, and warm, fueling wildfires. Unusually strong Santa Ana winds are accelerating fire spread.

⇒ While **lightning** is a common cause of wildfires in the U.S., it was ruled out as a potential cause, as no lightning was reported in the affected areas.



Anabatic vs Katabatic wind

Katabatic Wind	Anabatic Wind
<ul style="list-style-type: none"> • The wind blows down a slope due to gravity (air moves downhill) 	<ul style="list-style-type: none"> • Blows up a hill or mountain slope facing the Sun (air moves higher slopes).
<ul style="list-style-type: none"> • Occurs at night. 	<ul style="list-style-type: none"> • Occurs during the day.
<ul style="list-style-type: none"> • It is caused by the cooling of highlands and subsequent denser air flowing downhill. 	<ul style="list-style-type: none"> • It is caused by the Sun heating the slope, leading to rising warm air.
<ul style="list-style-type: none"> • It is more pronounced in calm air conditions. 	<ul style="list-style-type: none"> • It is best formed on sunny days with clear skies.
<ul style="list-style-type: none"> • Foehn (warmed by compression) and Fall Wind (rapid descent without warming) are the types of Katabatic winds 	<ul style="list-style-type: none"> • It has no specific subtypes.

Impact of Climate Change

- Research published in Nature Scientific Reports (2021) highlighted that **California's fire season** has **lengthened** over the past two decades, with the **peak shifting from August to July**.
- Global Warming → early snowmelt and longer dry seasons → moisture-stressed vegetation → more susceptible to wildfires (plants have less water).
- As climate change progresses, **extreme weather events** become more severe, leading to prolonged and intense wildfire seasons.

⇒ In 2024, California experienced its hottest June and July, along with the second-hottest October.

Potential Ignition Causes

- Strong winds can cause **power lines** to sway and come into contact with trees or other objects, potentially generating sparks and igniting dry vegetation. For example, the **2017 Thomas Fire** was caused by Southern California Edison power lines.
- Accidental or intentional human activities, such as campfires, fireworks, etc, can also trigger wildfires.

IMD's Weather Forecasting System

- ❖ **India Meteorological Department (IMD)** issues alerts using **colour codes** to effectively communicate weather conditions and associated risks.

IMD's Forecasting and Warning Systems

- **Doppler Weather Radars:** Analyze **raindrop movement** to forecast rainfall, thunderstorms & cyclones.
- **INSAT Satellites:** Provide real-time cloud monitoring for precise weather updates.
- **Numerical Weather Prediction Models (NWP):** Predict weather trends using atmospheric data.
- **Western Disturbances:** Cyclonic circulations impacting rainfall and snowfall in Northwest India.
- **SAFAR System:** Tracks air quality indices in urban areas for public health awareness.

Understanding IMD's Colour Codes

- **Green (No Action Needed):** Normal weather with no significant threats.
- **Yellow (Be Updated):** Light to moderate weather events requiring public awareness.
- **Orange (Be Prepared):** Severe weather will likely disrupt activities; precautionary measures are advised.
- **Red (Take Action):** Extreme weather necessitates immediate action to protect life and property.

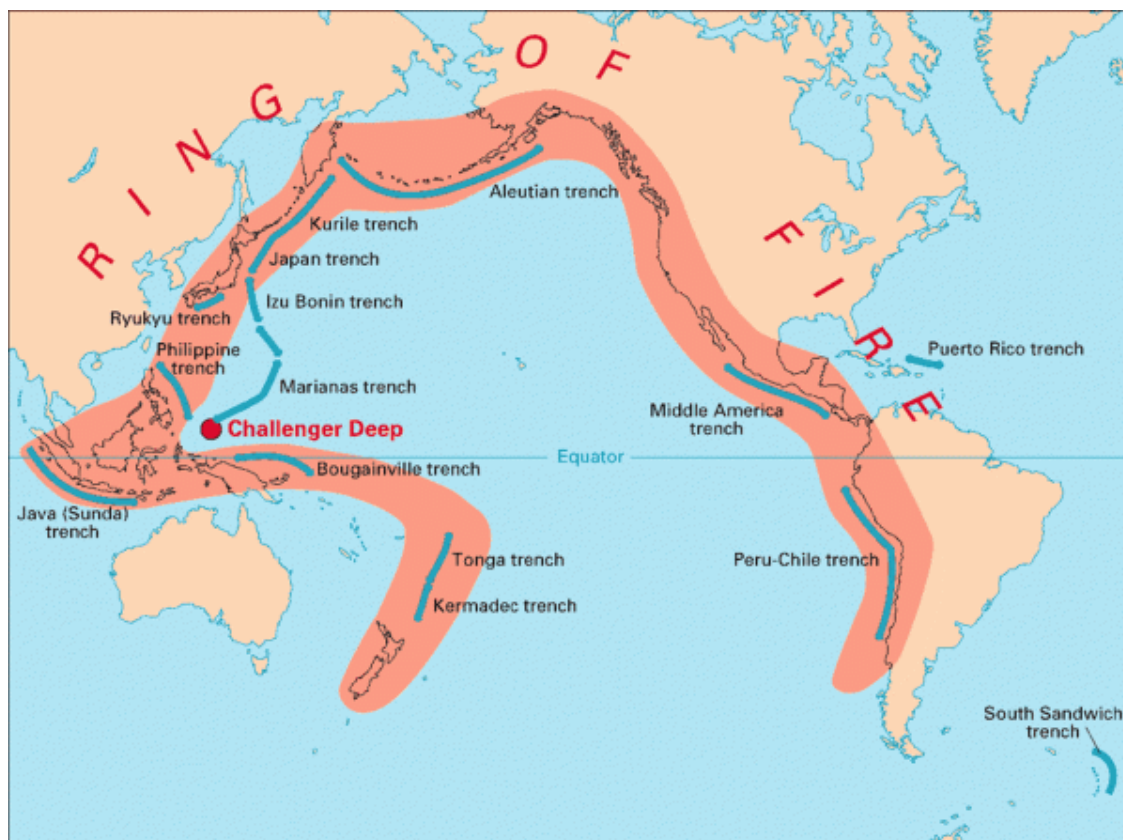
⇒ **Red Alert** is a general term indicating the need for extreme caution due to imminent danger, whereas **Red Warning** by IMD specifically means "Take Action" for extreme weather events like heavy rainfall or cyclones to safeguard life and property.

Ring of Fire: A Key Seismic Zone

- ❖ **Japan** experienced a significant **earthquake** (magnitude 6.9) in the **Kyushu** area, which is part of the Ring of Fire, leading to tsunami advisories and heightened seismic activity.

Overview of the Ring of Fire

- The **Ring of Fire** is a **horseshoe-shaped zone** containing **hundreds of volcanoes** and **earthquake sites** around the **Pacific Ocean**. It stretches nearly 40,250 kilometres.
- It is the meeting point of numerous **tectonic plates**, including the **Eurasian, North American, Juan de Fuca, Cocos, Caribbean, Nazca, Antarctic, Indian, Australian, Philippine**, and other smaller plates,
- It is where tectonic plates converge, causing earthquakes and volcanic activity. **90% of the world's earthquakes** take place here.
- It runs **through 15 countries**, including the USA, Indonesia, Mexico, Japan, Canada, Guatemala, Russia, Chile, Peru, and the Philippines.
- Due to their location, these countries face earthquake and volcanic risks.



Notable Earthquakes in the Ring of Fire

- **1960 Valdivia Earthquake:** The strongest recorded earthquake, measuring 9.5 on the **Richter scale**, occurred in Chile, part of the Ring of Fire.
- **Frequent Earthquakes:** The Ring of Fire experiences constant seismic activity, with many powerful earthquakes, including the 2011 **Tōhoku earthquake** in Japan.

Reasons for Frequent Earthquakes in the Ring of Fire

- **Tectonic Plate Movement:** Earthquakes occur due to constant interactions among **tectonic plates**, ie., sliding, colliding, or moving above/below one another.

- **Stuck Plate Edges:** Rough edges of tectonic plates often get stuck, causing pressure build-up, which leads to earthquakes when the plates unstick.
- **Japan's Vulnerability:** Japan's frequent earthquakes are due to its location at the meeting point of the Pacific, Philippine Sea, Okhotsk, and Eurasian plates.

Volcanic Activity in the Ring of Fire

- **Subduction Process:** Most volcanoes in the Ring of Fire are formed through subduction, where one tectonic plate is pushed beneath another, causing magma formation that rises to the surface.
- **Prevalence of Active Volcanoes:** The Ring of Fire is home to over **450 active** and **inactive volcanoes**, accounting for **75% of the world's total** volcanoes.
- **Volcanic Hotspots:** The western side of the Ring, spanning from Russia to New Zealand, contains the majority of active volcanoes.

Volcanism along the Pacific Ring of Fire

- Circum-Pacific region popularly termed the '**Pacific Ring of Fire**', has the greatest concentration of active volcanoes. Volcanic belt and earthquake belt closely overlap along the 'Pacific Ring of Fire'.

Regions with active volcanism along 'Pacific Ring of Fire'

- The **Aleutian Islands** in **Kamchatka, Japan,**
- **Philippines, and Indonesia (Java and Sumatra** in particular),
- Pacific islands of **Solomon, New Hebrides, Tonga** and **North Island, New Zealand.**
- **Andes to Central America** (particularly **Guatemala, Costa Rica & Nicaragua**), Mexico & right upto Alaska.

Trenches in the Ring of Fire

- **Mariana Trench:** The **deepest oceanic trench** in the world, reaching a depth of 7 miles, located within the Ring of Fire.
- **Other Major Trenches:** **Philippine Trench, Challenger Trench, Kuril-Kamchatka Trench, Peru-Chile Trench & Tonga Trench**, all of which are crucial in tectonic dynamics of the area.

Strategic Significance of the Ring of Fire

- ✓ **Rich in natural resources**, the Ring of Fire contains **vast mineral deposits**, making it critical for mining industries and global trade.

History

Kuka Martyrs' Day

- ❖ On January 17, Punjab CM paid tribute to 66 **Namdhari Sikhs**, executed by the British in 1872, at the **Namdhari Shaheed Smarak** in **Malerkotla**, marking **Kuka Martyrs' Day**.

What is the Kuka Rebellion?

- The **Kuka Rebellion**, led by the **Namdhari sect (Kukas)**, was an **anti-British uprising** in Punjab that blended religious reform with resistance to colonial authority.
- **Key Leaders:** Satguru **Ram Singh**, **Kuka Hira Singh**, and **Lehna Singh** spearheaded the rebellion.
- **Religious, Social, and Economic Reforms:** Focused on transforming society through religious practices, social structures, and economic independence reforms.
- **Distinctive Appearance:** Followers wore white, hand-spun clothing and saffron turbans, reflecting simplicity, **vegetarianism**, and **rejection of ostentation**.
- **Social Justice:** Advocated **abolition of the caste system**, improving women's status, promoting **widow remarriage**, and encouraging inter-caste marriages.
- **Religious Reform:** Emphasized returning to the **purest form of Sikhism**, as practised by **Guru Gobind Singh**, **opposing** social vices like meat consumption, alcohol, and foreign goods.
- **Self-Reliance:** Encouraged boycotting British goods, supporting indigenous industries, and promoting self-sufficiency.
- It reached its climax in **January 1872** with significant clashes in **Malerkotla** and **Malauhd Fort**.
 - ❖ **Jan. 13, Malerkotla Incident:** A group of 200 Namdharis clashed with govt officials owing to discontent with British rule and native collaborators over a cow slaughter incident.
 - ❖ **Jan. 15, Malauhd Fort Attack:** A 150-strong Kuka contingent attacked the fort, but they were repelled by British loyalists.
- **Mass Executions:**
 - ❖ On 17 and 18 January 1872, 67 Kukas were executed by cannon fire.
 - ❖ **Brutality:** Executions were witnessed by thousands to serve as a deterrent to other rebels.
 - ❖ **Martyrs:** Notable martyrs included **12-year-old Bishan Singh** and **Waryam Singh**, who displayed extraordinary bravery.

Post-Revolt

- **Exile:** Satguru Ram Singh & other key leaders were **exiled to Rangoon**, Burma and never returned.
- **Beliefs:** Namdharis believe that Satguru Ram Singh is still alive and will return, symbolised by their practice of wearing white.
- **Split:** Post-Satguru **Jagjit Singh's death** in 2012, the sect split into two factions, One led by **Thakur Dilip Singh** in Sirsa, Haryana. The other by **Sangrur Uday Singh** in Bhaini Sahib, Ludhiana.

Savitribai Phule

- ❖ On January 3, **1831**, **Savitribai Phule** was born in **Naigaon, Maharashtra**, into the **Mali community**. **India's first woman teacher** and a social reformer, she was married at the age of 10 to **Jyotirao Phule** who educated her at home and later enrolled her in a teacher training institution in Pune.

Savitribai Phule's Contributions to Society

- ✓ **Pioneering Women's Education:** In 1848, Savitribai and Jyotirao Phule **established India's first girls' school** in **Pune**, promoting education for girls, Shudras, and Dalits despite strong societal opposition.
- ✓ **Social Welfare Efforts:** Provided shelter and protection to widows and rape victims through the '**Balyata Prati-bandak Gruha**'; Advocated for inter-caste marriages, widow remarriage, and the abolition of practices like child marriage, sati, and dowry.
- ✓ **Breaking Caste Barriers:** Promoted social equality through **Satyashodhak Samaj**, rejecting caste and religious barriers.
- ✓ **Defied Societal Norms:** Led her husband's funeral procession and performed the last rites, challenging traditional gender roles.
- ✓ **Relief Work During Crises:** Actively contributed to relief efforts during the **1896 famine** and the **1897 Bubonic plague**, tragically contracting the plague while aiding others.
- ✓ **Literary Contributions:** Authored several important works, including her first poetry collection, **Kavya Phule**, **Bavan Kashi Subodh Ratnakar** (1892), and **Matushri Savitribai Phulenchi Bhashane va Gaani**.

Challenges Faced by Savitribai

- **Resistance and Social Isolation:** Savitribai faced strong opposition from figures like **Bal Gangadhar Tilak** and was socially ostracised, even **disowned by her father-in-law**.
- **Physical Abuse and Exclusion:** She endured physical attacks and social exclusion yet remained steadfast in her mission, viewing the challenges as signs of her righteous cause.

International Relations

Cartographic Aggression

- **Cartographic Aggression** is the act of using maps to assert territorial claims without legal basis, often involving renaming locations or establishing settlements in disputed regions.
- China uses map renaming, settlement building, and territorial assertions to claim disputed areas (e.g., 11 locations in Arunachal Pradesh).

Indonesia's Full Membership in BRICS

- ❖ Brazil announced **Indonesia's** admission as a **full member** of **BRICS**.

Evolution of BRICS

- **BRICS Formation:** Established in **2009** with **Brazil, Russia, India & China** as **founding members**.

- **South Africa's Entry:** South Africa joined the bloc in **2010**, expanding it to BRICS.
- **Recent Expansions:** In 2023, **Iran, Egypt, Ethiopia**, and the **UAE** joined the group, with **Saudi Arabia** invited but not yet joined.
- **Current Membership:** Brazil, Russia, India, China, South Africa, Iran, Egypt, Ethiopia, UAE, and Indonesia.

Significance of Indonesia's BRICS Membership

- ✓ **Southeast Asia's Largest Economy:** Indonesia, the fourth-most populous nation globally, has the largest economy in Southeast Asia.
- ✓ A major boost to **South-South Cooperation**.

Other Countries Seeking BRICS Membership

- **Formal Applicants:** **Turkey, Azerbaijan**, and **Malaysia** have **applied** for BRICS membership.
- **Interest from Other nations** in joining the bloc, but specific names are not confirmed.

Net-Zero Banking Alliance

❖ Major U.S. banks, including Goldman Sachs, Wells Fargo, Citigroup, Bank of America, Morgan Stanley, and JPMorgan Chase, have recently **exited** the **Net-Zero Banking Alliance (NZBA)**.

❖ **Only 3 U.S.-based banks in NZBA:** Amalgamated Bank; Climate First Bank; Areti Bank.

⇒ **Net-Zero Banking Alliance (NZBA)** is a **UN-convened group** of global banks committed to aligning their lending and investment portfolios with **net-zero greenhouse gas emissions by 2050**.

• **Reasons for Exiting:** Political pressure from Republican politicians **warning that NZBA membership could breach antitrust rules**, especially if it reduced fossil fuel companies' financing.

⇒ **Antitrust rules** are laws designed to promote **fair competition** and prevent monopolistic practices. They ensure businesses do not engage in anti-competitive behaviour like price fixing or market manipulation.

Implications of Exits

- Concerns among climate advocates about **diminishing industry commitment to fossil fuel reduction**.
- Potential impact on global efforts to achieve **net-zero emissions** by 2050.
- European banks, subject to stricter climate regulations, continue their commitment to NZBA.

World Gold Council

❖ **World Gold Council (WGC) report**, 'Central Bank gold Statistics November 2024', noted that the **RBI** continued its 2024 buying streak, adding 8 tonnes to its gold reserves in November 2024.

- This lifted **RBI's** year-to-date buying to 73 tonnes and total gold holdings to 876 tonnes, maintaining its position as the **second largest buyer** in 2024 **after Poland**.
- The WGC is an international trade association for the gold industry, formed in 1987 by mining companies.
- Currently, 32 **gold mining companies** are its members.
- It is headquartered in **London** and has offices in **India**, China, Singapore, the UAE and the United States.
- It aims to stimulate and sustain demand for gold through market development.

Yarlung Tsangpo Project and its implications

- ❖ China's proposed construction of the **world's largest dam** on the **Yarlung Zangbo** or **Tsangpo (Brahmaputra)** in India) River in **Medog County** of the **Tibetan Autonomous Region (TAR)** presents one of the most serious challenges of the 21st century.

Understanding Tsangpo Dam

- **Scale and Investment:** The Tsangpo Dam is slated to be the **world's largest infrastructure project**, with a staggering investment of **\$137 billion**.
- **Location:** Situated in a **gorge** where the **Brahmaputra River** makes a **U-turn**, flowing through **Arunachal Pradesh** and into **Bangladesh**.
- **Geographical Features:** The Brahmaputra descends **25,154 feet** across the **Tibetan Plateau**, forming the **Earth's deepest canyon**.
- **Hydroelectric Potential:** The lower reaches of the river exhibit a vertical drop of **2,000 meters** over a 50 km stretch, holding an immense hydroelectric potential of nearly 70 million kilowatts. This is more than **three times** the installed capacity of **China's Three Gorges Dam** (22.5 million kilowatts).
- **Power Generation:** The Tsangpo Dam is expected to generate a colossal **60,000 MW** (60 GW) of electricity, making it a key player in global energy production.



India–U.S. Joint Manufacturing of Sonobuoys

- ❖ **India** and the **U.S.** have announced cooperation on the co-production of U.S. **Sonobuoys** to enhance **Undersea Domain Awareness (UDA)** for the **Indian Navy**.

Sonobuoys

- **Sonobuoys** are lightweight, expendable devices for detecting submarines and other underwater threats, vital for undersea domain awareness (UDA).
- **Deployment:** Released from aircraft or ships, they activate upon water impact and transmit acoustic data.
- **Components:** Equipped with hydrophones for sound detection and radio transmitters for data relay.
- **Data Transmission:** Acoustic signals are sent to operators in real-time via VHF (Very High Frequency) or UHF (Ultra High Frequency) radios.

Key Features of the Initiative

- **Co-Production:** Split between the U.S. and India under 'Make in India' principles.
- **Technology Transfer:** Ultra Marine and Bharat Dynamics Limited (BDL) will pursue new sonobuoy technologies optimised for Indian Ocean conditions.
- **Interoperable Platforms:** Designed for use across U.S. and Indian **P-8I aircraft**, MH-60R helicopters, and MQ-9B Sea Guardian drones.

Indian Navy Platforms Using Sonobuoys

- **P-8I Aircraft:** Long-range maritime patrol aircraft.
- **MH-60R Helicopters:** Multi-role helicopters for anti-submarine warfare.
- **MQ-9B Sea Guardian:** High-altitude, long-endurance drones to be delivered starting in 2029.

US AI Export Rule

- ❖ The **US administration's new export regulation** framework places **India** in the **second tier**, limiting its access to high-powered AI hardware like GPUs, potentially impacting its AI plans.

Three-Tier Framework for AI Hardware Export Restrictions

Tier 1: Closest US Allies

- Includes 18 countries like Australia, **Canada, Japan**, and the UK.
- **No** significant export **restrictions** on AI chips and GPUs.
- Minimal security requirements for deploying computing power.

Tier 2: Majority of Countries (Including India)

- Includes most countries, with **India** placed in this category.
- Restriction of importing **50,000 advanced AI chips** by 2027, possibly doubling this limit if a specific agreement is made with the US.
- India's AI infrastructure, such as the **IndiaAI Mission**, may be impacted as it aims to procure 10,000 GPUs.
- Smaller firms are unlikely to be affected by the export restrictions.

Tier 3: Countries of Concern

- Includes **Russia, China, North Korea, Libya**, and other nations with severe export restrictions.
- Export of AI technology from the US to these countries is almost prohibited.

General Validated End User (GVEU): A Special Provision

- **Indian companies** with this authorisation can use exported AI technology for civilian and military purposes, **excluding nuclear use**.
- **Chinese companies** can only use the technology for **civilian applications**.
- **India** and **China** are the only countries with this **special provision**.

Delhi Land Reforms Act Controversy

- ❖ **Sections 33 and 81** of the **Delhi Land Reforms Act** stirred controversy ahead of **Delhi elections** over unfulfilled repeal promises by the Union government.

Key Provisions of Delhi Land Reforms Act, 1954

- **Objective:** Enacted **to reform the Zamindari system** and unify **tenancy** laws in Delhi.
- **Tenure Holders:** Recognizes two types of land tenure holders—**Bhumidhar** and **Asami**.
- **Repeal of Previous Laws:** Including **Punjab Tenancy Act 1887** & **Agra Tenancy Act 1901**.

Section 33

- Restricts sale, gift/ transfer of agricultural land if it results in the owner retaining **less than 8 acres** of land.
- Aims to **prevent fragmentation** into uneconomic holdings.
- **Exceptions:** Transfers **only** to religious/charitable institutions and **Bhoodan movement** beneficiaries.

Section 81

- Prohibits using agricultural land for non-agricultural purposes like housing or commercial activities.
- Violations result in the land vesting with the Gram Sabha.
- **Permitted uses:** Agriculture, horticulture, animal husbandry, pisciculture, and poultry farming.

Polity

Ad-Hoc Judges

- **Ad-Hoc Judges** are **temporary** judicial appointees **nominated** for specific cases, projects, or limited periods, unlike regular judges appointed through standard procedures.
- Appointed when there is a **lack of quorum** in the Supreme Court.
- Enjoy the salary, powers, and privileges of Supreme Court judges during tenure.

Tenure of Ad Hoc Judges

- **Duration:** Typically for 2–3 years or as required.
- **Renewability:** Extended based on judicial needs and case backlogs.

Eligibility Criteria

- **Experience:** Must have served as a **judge** in the same or another High Court.
- **Age:** Retired judges physically and mentally fit for duty.
- **Expertise:** Specialization in specific areas of law may be required.

Appointment

- **Trigger for Appointment:** High case pendency (8-10 years delay) or when over 20% of regular judge positions are vacant (**2021 Lok Prahari guidelines**).
- **Appointment of HC Ad-hoc Judges:** Chief Justice of the High Court with the **President's consent**, Governed by **Article 224A** of the Indian Constitution.
- **Appointment of SC Ad-hoc Judges:** CJI with President's approval after consulting the concerned High Court Chief Justice, Governed by **Article 127**.

Role and Powers

- **Equal Authority:** Same powers, responsibilities, and privileges as permanent judges.
- **Division Bench Participation:** Often included in benches to expedite specific cases, like criminal appeals.

1st Foundation Day of Lokpal

- ❖ **India** celebrated the **1st Foundation Day** of the **Lokpal**, marking 11 years since its establishment under the Lokpal and **Lokayuktas Act, 2013**.
- ❖ **Lokpal** and **Lokayukta** perform the function and role of an **"Ombudsman"**.

Historical Background

- The concept of ombudsman originated in **1809** in **Sweden**.
- In India, the former law minister **Ashok Kumar Sen** became the **first Indian to propose** the concept of a constitutional Ombudsman in Parliament in the early 1960s.
- Further, **Dr. L. M. Singhvi** coined the terms **Lokpal** and **Lokayukta** in **1963**. Later, in 1966, the **First Administrative Reforms Commission (1966)** passed recommendations regarding the establishment of two independent authorities at the central and state levels.
- **Lokpal and Lokayuktas Act, 2013:** This act established **statutory bodies** to combat corruption in public offices. Lokpal was constituted on **January 16, 2014**, as a **two-tier system**, with Lokpal at the Union level and Lokayuktas at the State level.
- The **first Chairperson** was appointed in 2019, **Justice Pinaki Chandra Ghosh**.

Other Anti-Corruption Legislations

- **Prevention of Corruption Act, 1988 (Amended in 2018):** Criminalizes bribery and corruption with stricter penalties.
- **Whistleblowers Protection Act, 2014:** Ensures protection for whistleblowers from threats.
- **Right to Information Act, 2005:** Promotes transparency in government operations.
- **Prevention of Money Laundering Act 2002:** Strengthens global cooperation against money laundering.
- **Companies Act, 2013:** Regulates corporate fraud and governance.
- **Benami Transactions (BT) Act, 1988 (Amended 2016):** Criminalizes BT to conceal ownership.
- **Black Money Act, 2015:** Targets undisclosed foreign income and assets with heavy penalties.
- **Fugitive Economic Offenders Act, 2018:** Confiscates assets of offenders fleeing abroad.

Lokpal and Lokayuktas Act, 2013

Structure of Lokpal

- The **Chairperson** is a former CJI or Supreme Court Judge, with **up to 8 members**, equally divided between judicial and underrepresented groups (SC/ST/OBC, minorities, and women).
- **Appointment:** Made by the President based on recommendations from a Selection Committee.

Composition of the Lokpal Selection Committee

- **Prime Minister** as the Chairperson of the committee
- **Speaker of Lok Sabha**
- **Leader of Opposition (Lok Sabha)**
- **Chief Justice of India** or a Supreme Court Judge nominated by them
- **Eminent Jurist** recommended by the President of India

Mandate, Powers and Functions

- **Legal Authority:** Investigates corruption allegations against public officials under the **Prevention of Corruption Act, 1988**.
- **Anti-Corruption Oversight:** Ensures expeditious inquiry and prosecution of corruption cases while promoting accountability in governance.
- **Accountability Mechanism:** Refers complaints against central government servants to the **Central Vigilance Commission (CVC)** and oversees the accountability of public servants.
- **Autonomy and Independence:** Lokpal functions autonomously, with its inquiry and prosecution wings for investigation and trial.
- **Investigation and Supervisory Role:** Supervises the CBI, authorises search and seizure operations, and prevents the destruction of records during inquiries, thus ensuring fair and unbiased investigations.
- **Civil Court Powers:** The **Inquiry Wing of the Lokpal** is vested with civil powers of the Court for summoning, requisitioning documents, and examining witnesses.
- **Asset Confiscation:** Confiscates assets and proceeds gained through corruption in special cases.
- **Administrative Actions:** Recommends transfer, suspension, or other actions against public servants linked to corruption allegations.
- **Reporting:** Submits an **annual report** to the **President**, tabled in both Houses of Parliament.

Jurisdiction

- **Coverage of Officials:** Includes the PM (with specific exceptions), Union Ministers, Members of Parliament, and Groups A, B, C, and D officials.
 - ❖ **Exceptions for PM:** Lokpal **cannot** probe allegations against the **Prime Minister** about **international relations, security, atomic energy & space** unless a full bench agrees with a **2/3rd majority**.
- **Institutional Scope:** Covers chairpersons, members, officers & directors of boards, corporations, societies, trusts/autonomous bodies funded wholly/partially by the govt or established by an Act of Parliament.
- **Foreign Contributions:** Encompasses societies, trusts, or bodies receiving foreign contributions exceeding ₹10 lakh.

- **Provisions for Whistleblowers:** Provides safeguards for whistleblowers under the **Whistle Blowers Protection Act, 2014**.
- **Complaint Mechanism:** Accepts complaints from **any individual** in the prescribed form, provided they pertain to offences under the **Prevention of Corruption Act, 1988**.

One Nation, One Election Bill

- ❖ The "**One Nation, One Election**" Bills were referred to a **Joint Parliamentary Committee (JPC)** for detailed examination and scrutiny.

Joint Parliamentary Committee (JPC)

- A JPC is a special committee of Parliament constituted for in-depth examination of legislative proposals or issues requiring detailed investigation.
- **Established when** one House passes a motion and the other agrees to it.
- **Composition:** Comprises members from both the Lok Sabha and the Rajya Sabha, including representatives from the ruling party and the opposition.
- **Current JPC:** The JPC for the "One Nation, One Election" Bills has **31 members** (21 from Lok Sabha and 10 from Rajya Sabha).

Functions and Powers of a JPC

- **Primary Functions:**
 - ❖ Investigates legislative proposals, financial irregularities, or public-interest matters.
 - ❖ Summons individuals and examines documents for evidence.
 - ❖ Submits reports with recommendations to Parliament.
- **Confidentiality:** Proceedings and findings are confidential, except in cases of public interest.
- **Limitations:** Recommendations are advisory and not binding on the government.
- **Follow-up:** Government submits an '**Action Taken Report**' to Parliament based on JPC findings.

'One Nation, One Election' Proposal

- Seeks to hold simultaneous elections for the Lok Sabha, State Assemblies, and local bodies across India.
- **Phased Implementation:**
 - ❖ Phase 1: Lok Sabha and State elections together.
 - ❖ Phase 2: Local body elections (municipalities and panchayats) within 100 days of the general elections.

Historical Context

- Simultaneous elections were conducted in **1951-52, 1957, 1962, and 1967**.
- Discontinued after the premature dissolution of some State Assemblies and the Lok Sabha in 1970.
- Revived in recent years to streamline the electoral process.

Constitutional Amendments Required

- **Article 83:** Amend to synchronise Lok Sabha tenure with state assemblies.

- **Article 85:** Create clear guidelines on prorogation and dissolution of Parliament.
- **Article 172 & 174:** Amend to standardise the tenure and dissolution of State Legislative Assemblies.

At 75: Evolving Interpretation of Article 21

- ❖ India celebrates 75 years of its Constitution, spotlighting Article 21, which upholds the right to life and personal liberty as a cornerstone of justice.

Constitutional Foundations of Liberty

- **Preamble:** Ensures liberty of **thought, expression, belief, faith, and worship**.
- **Article 19:** Protects freedoms of opinion, speech, and expression.
- **Article 21:** Guarantees the right to life and personal liberty, forming the essence of constitutional justice.

Evolution of Article 21 Over 75 Years

- **Narrow Initial Interpretation in A.K. Gopalan Case (1950):** Limited "personal liberty" to **physical freedom** and upheld restrictive state laws.
- **Expanded Interpretation:**
 - ❖ **Kharak Singh Case (1963):** Expanded personal liberty to **include privacy**.
 - ❖ **R.C. Cooper Case (1970):** Linked personal liberty with Article 19 freedoms.
 - ❖ **Maneka Gandhi Case (1978):** Redefined Article 21 to include **dignity and fair procedures**.
 - ❖ **Olga Tellis Case (1985):** Recognized the **right to livelihood** as part of personal liberty.
 - ❖ **Puttaswamy Case (2017):** Declared **privacy** a fundamental right linked to dignity.
- **Association for Democratic Reforms Case (2024):** Struck down the Electoral Bond Scheme for violating the right to information.
- **Progressive Rights:** Inclusion of **privacy, health, clean environment, and education** under Article 21, ensuring meaningful existence.
- **Recent Improvements:** Under Chief Justice Sanjiv Khanna (since November 2024), resolutions have risen by 16%.

One Nation, One Time

- ❖ Indian govt drafted new rules that mandate the exclusive use of **Indian Standard Time (IST)**.

Historical Evolution of Timekeeping in India

- **Ancient Timekeeping:** Early Indians used **water clocks** (called **Jalankantha**) and **sun dials** for time measurement in ancient civilizations like **Harappa**.
- **Vedic Influence:** In the **Vedic period**, time was divided into **muhurats** (periods) and **yugas** (epochs), reflecting spiritual and agricultural cycles.
- **Medieval Developments:** **Mughal rulers**, particularly **Akbar**, employed **astrological timekeeping** methods, including **zodiac-based time divisions**.
- **Astronomical Advancements:** **Aryabhata** and **Varahamihira** contributed significantly to precise time measurement through **astronomical instruments** like the **astrolabe**.

- **Colonial Impact:** The British colonial period introduced the **Western-style mechanical clocks**, marking a shift toward standardized time.
- **Post-Independence Standardization:** **Indian Standard Time (IST)** was formalized based on **Greenwich Mean Time (GMT)**, aligning entire country under a single time zone, headquartered at **Mirzapur**.
- **Modern Innovations:** In recent years, India has adopted digital technologies for precise time synchronization through **Indian National Time (INT)**, a network using **atomic clocks**.

Key Provisions of the Draft Rules

- **Mandatory Use of IST:** IST will be the **sole time reference** for all official and commercial platforms, including legal contracts and financial transactions.
- **Time-Synchronization Systems:** Government offices and public institutions must implement time-synchronization systems to ensure the availability, reliability, and cybersecurity of time data.
- **Prohibition on Alternative Time References:** Use of time references other than IST is prohibited for official and commercial purposes.
- **Penalties:** Violations will incur penalties, and periodic audits will be conducted to ensure compliance.
- **Applicability:** The rules apply across various sectors such as commerce, transport, public administration, legal frameworks, and financial operations.
- **Exemptions for Specialized Fields:** Fields like **astronomy, navigation, and scientific research** may request exceptions, subject to government approval.

The Whip System

History and Origins of the Whip System

- The term "whip" comes from the **hunting field**, where a "whipper-in" kept stray hounds together.
- **In politics**, first used by **Edmund Burke** to describe rallying party followers during parliamentary matters.

Whip System in India

- The concept of the whip was **inherited** from **colonial British rule**.
- It is often used in parliamentary parlance for **floor management** by political parties.
- A whip is a **written order** that a **political party issues** to its members for **being present** for a crucial vote or **that they vote only in a particular way**.
- A whip is also an essential **office-bearer** of the party in the Parliament.
- In India, all parties can issue a whip to their members.
- The **office of 'whip'** is mentioned **neither in the IC**, in the **Rules of the House**, nor in the **Parliamentary Statute**. It is **based** on the **conventions** of the parliamentary government.
- **In India**, the system has been in place since the early days of Parliament, ensuring party unity & discipline.
- The **All-India Whips Conference**, held **annually since 1952**, fosters coordination between ruling and opposition whips for efficient parliamentary functioning.

Types of Whips

- **One-Line Whip:** Informs members of a vote, allowing them to abstain.
- **Two-Line Whip:** Requires MPs to be present, but **does not mandate how to vote**.
- **Three-Line Whip:** The strictest, instructing members to vote in alignment with the party.

Government's Chief Whip

- **In Lok Sabha:** The **Minister of Parliamentary Affairs** acts as the Chief Whip for the ruling party.
- **In Rajya Sabha:** **Minister of State for Parliamentary Affairs** handles this responsibility.

Procedure for Enforcement of the Whip

- **Issuance of Directive:** The party issues a whip, specifying attendance and voting directions.
- **Mandatory Compliance:** Members must adhere to the whip to maintain party unity.
- **Expulsion:** Severe breaches may lead to expulsion from the party.
- **Action Against Defiance:** Party leaders may recommend disqualification under the Anti-Defection Law (1985) for violations.

Exceptions to Whip Compliance

- **Conscience Votes:** MPs can vote freely on moral or ethical issues, with party permission.
- **Prior Approval:** Members may defy the whip if explicitly allowed by party leadership.

Revival of Arunachal Pradesh Freedom of Religion Act

- ❖ **Arunachal Pradesh** is **reviving** the **1978 Act** to curb **forceful religious conversions** by framing rules for its implementation after decades of dormancy.
- ❖ The Act remained **unenforced since 1978** due to unframed rules. Christian groups, including the **Arunachal Christian Forum**, oppose it, citing potential misuse and increasing resistance.

- ⇒ **Major Ethnic Groups in Arunachal Pradesh:** *Adi, Nyishi (largest), Galo, Apatani, Tagin, Aka, Monpa, Sherdukpen, Khampti, Singpho, and Mishmi.*
- ⇒ **Ethnic and Religious Diversity:** *Regions are divided by ethnic dominance, with diverse indigenous beliefs like Donyi Polo, Theravada Buddhism, and polytheistic worship.*

Key Features of Arunachal Pradesh Freedom of Religion Act 1978

- **Prohibition of Forceful Conversion:** Bans religious conversions through force, inducement, or fraud.
- **Punishments:** Violators face imprisonment (up to two years) and fines (up to ₹10,000).
- **Mandatory Reporting:** All conversions must be reported to the **District Deputy Commissioner**.
- **Focus on Indigenous Faiths:** Protects **local practices** like **Donyi Polo** and **Mahayana Buddhism** while countering external influences.

National Anthem Protocol

- ❖ Tamil Nadu Governor walked out of the Legislative Assembly without delivering his opening address for the year, citing the **absence** of the **National Anthem** before his speech.

About the National Anthem

- Composed by **Rabindranath Tagore** in **Bengali**; first sung on **December 27, 1911**, during the Indian National Congress session in **Kolkata**.
- Officially adopted on **January 24, 1950**, the **Hindi version** uses the **first stanza** of the original poem.
- **Duration:** The full version runs 52 seconds when sung or played in its entirety; the **shorter version** is **approximately 20 seconds**.

Constitutional and Legal Provisions

- **Article 51(A)(a):** Enlists respecting the National Anthem as a **fundamental duty** for all citizens; Does not mandate specific occasions for playing or singing the anthem.
- **Prevention of Insults to National Honour Act, 1971:** **Deliberate insult** or disturbance during the National Anthem is punishable by up to **3 years of imprisonment**, a fine, or both.

Judicial Interpretations

- **Madras HC Ruling (2019):** **Dismissed** a petition demanding punishment for **non-playing of the anthem**, citing **no legal mandate** for mandatory singing or playing at all official functions.
- **SC Observations:** Playing the National Anthem in cinemas or other settings is **encouraged** but **not mandatory** unless specified.

Government Guidelines on Playing the National Anthem

- **Ceremonial Events:** Played during civil and military investitures and parades.
- **State Events:** Played during the arrival & departure of the **President/Governor** at formal state functions.
- **Dignitaries' Presence:** Played during national salutes involving the President, Governor, or dignitaries.
- **Naval Ceremonies:** Played during flag hoisting in naval ceremonies.
- **Flag Hoisting:** Mass singing is required during flag hoisting on Independence Day and Republic Day.

Key Practices in Legislative Assemblies

- **Tamil Nadu Assembly Protocol:** **Tamil Thai Vazhthu (State Anthem)** is sung at the start of Governor's address; **National Anthem** is played at the **end**. This convention began in **1991** under **AIADMK rule**.
- **Parliamentary Practice:** The National Anthem is played as the President enters and exits during the joint session of Parliament.
- **Variations Across States:** Different conventions exist; some states, like Nagaland, only recently began playing the anthem.

Vulnerable Sections of the Society

Jarawa Tribe

- ❖ 19 members of the **Jarawa tribe** of the **Andaman and Nicobar** Islands have been officially **enrolled in the electoral roll** for the **first time** in November 2024.
- **Tribal Classification:** The Jarawa tribe is recognised as a **Particularly Vulnerable Tribal Group (PVTG)**.
- **Demographic Trends:** The population **declined** during British colonial rule but stabilised post-independence, with an estimated current population of approximately **400 individuals**.
- **Lifestyle:** Jarawas are a **nomadic, hunter-gatherer tribe** relying on wild fruits, roots, honey and fish.
- **Housing:** They live in **temporary huts** on the western coast of South and Middle Andaman Islands.
- **Language:** The **Jarawa language** (of the Ongan family of languages) is unique, not mutually intelligible, and **critically endangered** as per **UNESCO's Atlas of the World's Languages in Danger**.

EmpowHER Biz Initiative

- ❖ **NITI Aayog's Women Entrepreneurship Platform (WEP)** partners with New Shop to empower women entrepreneurs in retail.
- ❖ **EmpowHER Biz** launched under **WEP's "Award to Reward (ATR)" program**, India's largest convenience retail chain, to equip aspiring women entrepreneurs with skills & resources for success in organised retail.

About Women Entrepreneurship Platform (WEP)

- Incubated by **NITI Aayog** in 2018; transitioned to public-private partnership in 2022.
- **Aim:** To **overcome Barriers** For Women Entrepreneurs by providing Access to Finance, Market Linkages, Training and Skilling, Mentoring & Networking, Compliance & Legal Assistance, and Business Development Services.
- **Collaborations:** Works with 30+ public and private sector partners.
- **ATR Framework:** Since 2023, provides a plug-and-play framework for impactful programs.

About New Shop

- **Entrepreneur Empowerment:** Aims to support 10,000 entrepreneurs in India by 2030 through its franchising model.

Features of EmpowHER Biz Initiative

- **Mentorship:** Focus on retail management, digital tools, financial literacy & business development.
- **Participant Selection:** 50 women **aged 18–35** were selected via an online application process based on defined criteria.
- **Franchise Fee Waiver:** Top 20 participants receive a **100% waiver** on New Shop franchise fees.
- **Target Regions:** Delhi NCR, Punjab, Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh, and Gujarat.

'Panchayat se Parliament 2.0' Programme

- ❖ Lok Sabha Speaker, at the '**Panchayat se Parliament 2.0**' programme, urged **women representatives** from Panchayati Raj Institutions (PRI) to embrace AI and innovation for better governance and socio-economic development.

Other Initiatives Driving Women's Empowerment in India

- **Entrepreneurial Growth for Tribal Women:** Encouraging tribal women to drive economic growth by promoting traditional crafts, local enterprises, and online businesses for self-reliant villages.
- **Launch of Inclusive Communication Tools:** Introduction of '**Sansad Bhashini**,' an AI-powered tool translating speeches into multiple Indian languages to ensure wider inclusivity.
- **Legislative Support for Women Leadership:** The **Nari Shakti Vandan Act** is a transformative step toward empowering women in leadership and promoting rural self-reliance.
- **Promoting Women-Led Governance:** Strengthening democracy by encouraging women leaders in rural and tribal communities, with notable success **exceeding the 33% reservation for women** in PRIs.
- **Technological Integration for Development:** Urging women PRI leaders to adopt AI and technological innovations for sustainable development and better local governance.

Agriculture

Geo-tagging and Aadhaar for Chinar Conservation

- ❖ Jammu & Kashmir government has launched the "**Tree Aadhaar**" mission to conserve declining chinar trees by giving them unique identities and geo-tagging them for monitoring.

Chinar Tree

- **Botanical Name:** **Oriental plane tree** (*Platanus orientalis* var. *cashmeriana*).
- **Habitat:** Found in **cool climates** with ample water, primarily in **Eastern Himalayas**.
- **Size:** Grows up to 30 meters tall, with a girth of 10-15 meters.
- **Growth:** Takes **30-50 years to mature**; reaches **full size after 150 years**.

Historical and Religious Importance

- **Mughal Influence:** **Introduced by Mughals**, particularly during **Jahangir's** reign, who planted chinars in **Naseem Bagh** and **Chaar Chinari**.
- **Religious Significance:** Often found near Muslim and Hindu **shrines in Kashmir**.
- **Cultural Significance:** **State tree of Jammu & Kashmir**, featured in local art, craft, and literature.
- **Artistic Significance:** Chinar motifs are common in **papier-mache, embroidery, carpets, and walnut wood carvings**.
- **Oldest Known Chinar Tree:** Planted by a Sufi saint, is located in **Chattergam village, central Kashmir**.

Tree Aadhaar Mission

- **Census:** A census of chinar trees across the Kashmir valley and Chenab region has been conducted.
- **Geo-tagging:** Each tree is assigned a unique identity (Tree Aadhaar) & geo-tagged for easy identification.
- **Current Status:** 28,560 trees geo-tagged, out of an estimated 32,000-33,000 trees.
- **QR Code System:** Metallic QR codes placed on trees provide data on 25 parameters, including:
 - ❖ Geographic location (longitude, latitude).
 - ❖ Tree's age, height, girth, branch count, and health.
 - ❖ Canopy size and eco-threats.

Nano-Urea

- Nano-urea is a **liquid solution** containing **4% nitrogen (20g N) per 500 ml bottle**, introduced as a more efficient substitute for traditional urea.
- It is essentially **urea (nitrogenous fertiliser)** in the form of a **nanoparticle**. It has a desirable particle size of about 20-50 nm and more surface area.
- The liquid nano urea produced by **Indian Farmers Fertiliser Cooperative (IFFCO)** is an alternative to conventional nitrogen (N) fertiliser.

- **Application Method:** Unlike conventional urea applied to the soil, nano-urea is sprayed directly on the plant leaves, purportedly enhancing nitrogen absorption.
- **Cost and Benefits:** A bottle of nano-urea costs ₹260, slightly more than a 45-kg bag of urea, and is intended to reduce overall urea consumption, leading to savings on imports.

Claimed Advantages

- Nano Urea is produced by an **energy-efficient**, environment-friendly production process.
- **Increased availability** to crop by more than 80%, resulting in **higher Nutrient Use efficiency**.
- While conventional urea has an efficiency of about **25 per cent**, the **efficiency of liquid nano urea** is as high as **85-90 per cent**.
- Helps in **reducing** the country's **subsidy bill**.
- **Reduces** the **unbalanced** and **indiscriminate use of conventional urea**, thereby minimising soil, water, and air pollution.
- Provides a **targeted supply of nutrients to crops** as Liquid nano urea is **sprayed directly on the leaves (foliar fertilisation)** and gets absorbed by the plant.

Recent Findings: Concerns Over Efficacy

- **Protein and Yield Reduction:** Punjab Agricultural University found that the application of nano-urea resulted in a **35% decrease in rice protein content** and a 24% reduction in wheat protein content.
- **Root Development Issues:** The trials also showed a reduction in root length and dry weight, which hindered nitrogen uptake from the soil, further limiting crop growth and yield.
- **Dependency on Soil Nitrogen:** The plants in the study were primarily relying on nitrogen from the soil, as nano-urea was ineffective in providing sufficient nitrogen through foliar application.
- **Ineffectiveness of New Formulations:** Alternative formulations of nano-urea with 8% and 20% nitrogen content also failed to improve yields in trials, casting doubt on its overall effectiveness.

Environment & Ecology

Greenland's Lakes Turn Brown: A Carbon Crisis

- ❖ Greenland's lakes **turned brown** & began emitting carbon dioxide due to extreme weather events.

Causes of Transformation

- **Warm Temperatures and Rain:** Typically, Greenland experiences snowfall in fall, but 2022's higher temperatures resulted in rain instead, which caused **thawing of permafrost**.
- **Permafrost Thawing:** Thawing permafrost released **organic carbon, iron, magnesium**, and other elements, which were washed into the lakes, altering their composition.
- **Atmospheric Rivers:** Strong atmospheric rivers, which transport water vapour across regions, intensified the rainfall and contributed to higher temperatures, further impacting the lakes.

Impact of Extreme Weather

- **Physical, Chemical, and Biological Changes:** The lakes' water quality deteriorated; colour, odour, and taste dramatically altered due to increased organic carbon and other elements.
- **Water Quality Decline:** Increased dissolved organic material resulted in harmful chlorination byproducts (**trihalomethanes**), potentially **carcinogenic**.
- **Phytoplankton Impact:** Reduced sunlight penetration hindered phytoplankton, which rely on sunlight for photosynthesis and carbon dioxide absorption.
- **Carbon Emissions Surge:** The lakes, **once carbon sinks**, became sources of carbon dioxide, with **emissions increasing by 350%**.

Impact of Climate Change on the Water Cycle

- ❖ The **2024 Global Water Monitor Report** by researchers from Australia, Saudi Arabia, China, and Germany highlights how **climate change** is disturbing **Earth's water cycle**, contributing to more extreme weather events like **floods** and droughts.

Water Cycle

- The water cycle involves **water's continuous movement** in various forms: **solid, liquid, and gas**. It regulates Earth's weather and ensures water availability for life.
- Water evaporates from bodies of water and soil, then condenses as clouds before falling as precipitation.
- Precipitated water replenishes oceans, rivers, and soils while also being absorbed by plants.

Climate Change's Impact on the Water Cycle

- **Increased Evaporation:** Higher temperatures cause more water to evaporate, intensifying water cycle.
- **More Moisture in the Atmosphere:** For every **1°C increase**, the air can hold **7% more moisture**, resulting in more intense storms.
- **Extreme Weather Patterns:** More frequent & intense droughts and storms put communities, infrastructure, and ecosystems at risk, disturbing soil moisture & increasing the risk of floods and dry spells.
- **Water Scarcity and Flooding:** As regions face water shortages, floods in other areas create unmanageable water surpluses.
- **Agricultural Impact:** Droughts & floods severely disrupt food production & water supplies for irrigation.

Findings of the 2024 Report

- **2024 as Hottest Year:** 2024 marked the hottest year on record, with temperatures 1.2°C higher than the start of the century.
- **Water-related Disasters:** Over 8,700 deaths, 40 million displaced people & \$550 billion lost in damages.

Scientific Findings

- **Intensified Water Cycle:** A study from 2022 showed a 7.4% increase in global water cycle intensity due to climate change.

- **Ocean & Atmospheric Changes:** Rising sea temp intensified cyclones, further disrupting water patterns.
- **Growing Extremes:** The frequency of both severe droughts and floods is expected to continue growing as global temperatures rise.
 - ❖ **Extreme Precipitation:** Record-high rainfall occurred 27% more often than in 2000; daily rainfall records set 52% more frequently.
 - ❖ **Water Scarcity:** Many dry regions showed low water storage, increasing drought severity in areas like the Amazon Basin and southern Africa.

Conservation Colonialism

- ❖ **Andaman and Nicobar** administration's **unilateral decision** to declare wildlife sanctuaries in southern Nicobar exemplifies conservation colonialism, imposing **top-down conservation** models.

- ⇒ **Conservation Colonialism:** *The displacement or marginalisation of indigenous communities in the name of environmental conservation, often ignoring sustainable practices and traditional rights.*
- ⇒ *Indigenous peoples globally manage lands that hold 80% of the planet's biodiversity, yet their rights are often violated under the pretext of conservation and development.*

Issues with Great Nicobar Project

- **Weak Ecological Justification:** **Meroë** and **Menchal sanctuaries** show insufficient ecological significance due to **low Megapode bird populations** and **unclear coral diversity**.
- **Threat to Ecosystems:** The ₹72,000-crore **Great Nicobar Project** threatens vital ecosystems like the **Galathea Bay Wildlife Sanctuary** and endangered species habitats.
- **Legal and Institutional Barriers:** **Inadequate implementation** of the **Forest Rights Act (FRA)** and conflicts between development and conservation hinder recognising indigenous rights.
- **Impact on Indigenous Livelihoods:** The project endangers the traditional homelands and livelihoods of the Nicobarese people, particularly the Shompen, who face displacement.

Garudakshi Portal

- **Karnataka's Forest Department** has launched the **Garudakshi portal** with pilot implementation in Bengaluru Urban, Bhadravathi, Sirsi & **Male Mahadeshwara Wildlife Sanctuary** divisions.

- ⇒ *The **Male Mahadeshwara Wildlife Sanctuary** Division in **Karnataka** includes areas surrounding the **Male Mahadeshwara Hills**, located in the **Chamarajanagar district**. This sanctuary is **part of the larger Biligiri Ranganatha Hills (BR Hills) range** and is known for its rich biodiversity, including several species of flora and fauna.*

- Introduced by the Karnataka Forest Department in partnership with the **Wildlife Trust of India** to facilitate **online registration of FIRs** related to **wildlife and forest offences**.
- **Mandatory Online FIR Registration:** Modeled on the police's online FIR system, FIR registration via the portal will be compulsory upon implementation.
- **Automation:** Auto-generates formats for reports and complaints.
- **Public Access:** Enables public complaints via mobile phones or emails.

- **Modules Included:** Online Forest Offence Registration; **Investigation Module** tracks case progress and assists investigators; **Reporting Module** provides insights into trends, complaints, and chargesheets filed; **Legacy Case Registration Module** converts existing cases into digital format.

Greater Hessarghatta Grasslands Conservation Reserve

- ❖ **Karnataka** approved the declaration of **Greater Hessarghatta Grasslands** as a conservation reserve.
- Near Yelahanka, **Bengaluru** Urban district, it spans **5,678 acres**, including 350 acres of remaining grassland and three large lakes.
- **Biodiversity:** Home to **133 bird species, leopards, wolves, foxes, and slender loris.**
- **Water Resources:** Contains three significant waterbodies essential for local wildlife.

Importance of Being Declared a Conservation Reserve

- A conservation reserve is an area **owned by the state government** and is generally found **adjacent to National parks and sanctuaries** and those areas that link one protected area with another.
- The state government may after consulting local communities, declare any area as **“Conservation Reserve ”** under **section 36A** of the **Wild Life (Protection) Act 1972.**
- Declaration as a conservation reserve **ensures legal protection** for the flora, fauna, and water bodies within the area.
- The area will be managed by the **Karnataka Forest Department**, with conservation programs focusing on maintaining biodiversity and ecosystem integrity.

Mugali-Apsarkonda Marine Sanctuary

- Proposed marine sanctuary **near Honnavar, Uttara Kannada district**, covering approximately **14,000 acres, including mangrove forests.**
- Home to several endangered species found in coastal regions, it is **crucial for marine life conservation** in Karnataka's coastal ecosystems.

India's First Wetland-Accredited Cities

- ❖ **Indore** and **Udaipur** became the first Indian cities to receive **Wetland City Accreditation (WCA)** under the **Ramsar Convention on Wetlands** (globally 31 accredited cities).
- **Sirpur Lake (Indore)**, a Ramsar site, is recognised for its role in **water bird congregation** and is being developed as a **bird sanctuary.**
- **Udaipur** is surrounded by five important wetlands: Pichola, Fateh Sagar, Rang Sagar, Swaroop Sagar, and Doodh Talai and these wetlands play a crucial role in the city's **cultural identity, microclimate regulation,** and protection against extreme weather events like **floods.**

Wetland City Accreditation

- The **Wetland City Accreditation (WCA)** is a **voluntary international recognition scheme** established by the **Ramsar Convention** to promote the conservation and wise use of **urban wetlands.**

- It aims to recognise cities that actively conserve and sustainably manage their **natural or human-made wetlands**.
- The scheme aims to promote the **socio-economic benefits** that wetlands provide to urban areas, such as flood control, water quality improvement, and recreational opportunities.

Vermifiltration Technology

- ❖ Aandhi, a village near Jaipur, Rajasthan, is pioneering a **zero-waste model** with **Vermifiltration** technology to treat wastewater and support sustainable waste management.

⇒ **Vermifiltration:** A green technology & a wastewater filtration process using **epigeic earthworms** and **microorganisms** to filter & break down wastewater pollutants in an active vermifilter zone.

How Does Vermifiltration Work?

- **Multi-stage Treatment:** Combines primary (sand and silt removal), secondary (biological degradation), and tertiary (pathogen removal) filtration processes.
- **Integration with Other Systems:** When combined with solar energy systems, vermifiltration offers an energy-efficient and eco-friendly solution to wastewater management.

Harmful Chemicals in Black Plastic Products

- ❖ Recent research shows that **recycled black plastics** in **cooking utensils** and **takeaway containers** contain **harmful chemicals**, endangering human health and the environment.

Hazards of Recycled Black Plastics

- **Use of Flame Retardants:** Black plastics, often **recycled from electronics**, contain **flame retardants** like **DecaBDE** (Decabromodiphenyl Ether) to prevent fires.
- **Chemical Contamination:** Recycling electronics can leave **harmful additives** in household items, including kitchen utensils (spatulas, peelers, spoons), takeaway containers (sushi trays), and children's toys (plastic cars, medallions).
- **Limited Regulation:** Inadequate checks on recycled plastics lead to toxic substances in everyday objects.

Health Risks of Black Plastics

- **Carcinogenic:** Flame retardants are linked to **carcinogenic effects** and hormonal disruptions.
- **Nerve and Reproductive Damage:** Long-term exposure can harm the nervous & reproductive systems.
- **Thyroid Disruption:** Chemicals like **2,4,6-Tribromophenol** are associated with **thyroid dysfunction**.
- **Environmental Leaching:** Toxic substances migrate from items like utensils to food & from toys to saliva.

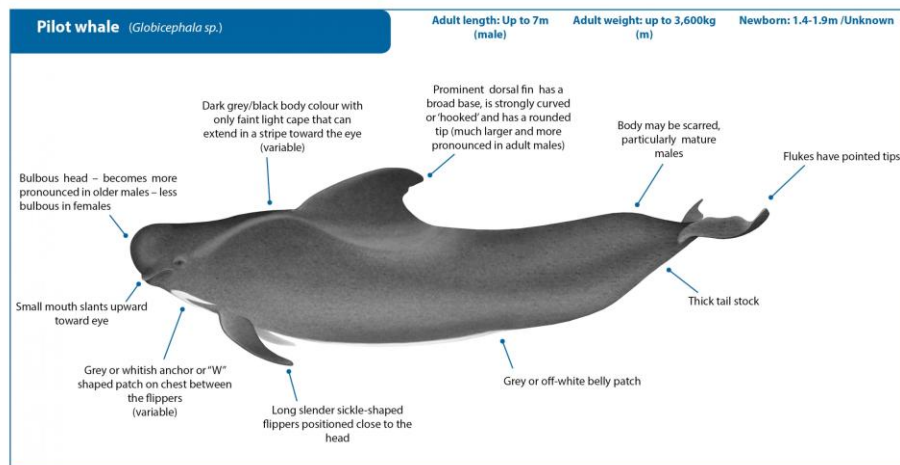
Pilot Whale Stranding in Sri Lanka

- ❖ 14 **pilot whales** stranded on the shores of **Kalpitiya, Sri Lanka's west coast**, highlighting the phenomenon of **Whale Strandings/ Whale Beaching**.

Pilot Whales

- **Species:**

- ❖ **Short-finned Pilot Whale (*Globicephala macrorhynchus*):** Found in **tropical** and **warm-temperate** waters. IUCN Status: LC.
- ❖ **Long-finned Pilot Whale (*Globicephala melas*):** Found in **colder waters**, are further subdivided into three sub-species: the Southern long-finned pilot whale (*G. m. edwardii*), the North Atlantic long-finned pilot whale (*G. m. melas*), and the now extinct North Pacific long-finned pilot whale (*G. m. un-named subsp.*). IUCN status: **CR**.
- **Social Structure:** Highly social, often travelling in groups led by a dominant individual.
- **Males** of both species are **larger** than females. **Both** species are **black**; some individuals have a pale, elongated anchor-shaped mark adorning the throat and chest.



What is Whale Stranding?

- **Whale stranding, or whale beaching**, is a phenomenon where whales, dolphins, and porpoises **swim into shallow waters** and become **trapped on land**, often on beaches, often resulting in injury or death.
- **Mass strandings** sometimes can involve hundreds of marine animals at once.

Causes of Whale Stranding

- **Topography:** Shallow coastal areas can contribute to strandings, especially where deep waters rapidly transition to shallow regions.
- **Illness or Injury:** Sick or injured whales may end up stranded.
- **Anthropogenic Activities:** Commercial ships, military sonars, offshore drilling create disruptive **noise pollution**, which can disorient whales, affecting their ability to navigate, communicate, and find food.
- **Predation:** Threats from predators like killer whales or sharks may cause panic.
- **Rising Sea Temperatures:** Altered prey distribution may push whales closer to shore, increasing the risk of strandings.
- **Seismic Activity** like that in the Indian Ocean may disrupt whales' navigation.

Locations Prone to Stranding

- **Sri Lanka:** Kalpitiya (2023), Panadura (2020), & other coastal regions have experienced whale strandings.

- **Tasmania, Australia:** Notable for mass strandings, such as the **2020 incident** with 230 pilot whales.
- **Golden Bay, New Zealand & Cape Cod, Massachusetts, USA:** Hotspots with frequent strandings.

Rising Deaths of Olive Ridley Turtles in Tamil Nadu

- ❖ Many dead **Olive Ridley turtles** have washed ashore in Tamil Nadu, particularly in Chennai, raising concerns over the safety of this endangered species during their nesting season.

Olive Ridley Turtles (*Lepidochelys olivacea*)



- Olive Ridley sea turtles are the **second-smallest** and most abundant sea turtles **globally**.
- They are known for unique **arribadas** (synchronised mass nestings), where thousands of females come together on the same beach to lay eggs.
- **Breeding Season:** Olive ridley turtles arrive on Tamil Nadu's coast from September to October, with nesting beginning in late November and lasting until March.
- **Egg-laying process:** Female turtles lay 100-110 eggs, covering them with sand to protect them from predators. Hatchlings emerge after 45-60 days.

Physical Characteristics

- Males and females grow the **same size**, but **females** have a slightly **more rounded carapace**.
- The carapace is **heart-shaped** and **rounded**, named "olive ridley."
- Hatchlings are **dark grey**, appearing black when wet.

Distribution

- They are found in **warm and tropical waters**, primarily in the **Pacific and Indian Oceans** and warm areas of the **Atlantic Ocean**.
- **Nesting Sites:** Major nesting sites are in **Odisha**, followed by **Andhra Pradesh** and **Tamil Nadu**.
- The **Gahirmatha Beach of Odisha (India)** is the **most significant** breeding ground for these turtles.
- **Diet:** They are **carnivorous**, especially in the **immature stages** of their lifecycle.
- **Conservation Status:** IUCN Red List: **Vulnerable**.

Indian Economy

Future of Jobs 2025 Report

- ❖ The **World Economic Forum's "Future of Jobs 2025" report** highlights the top 10 fastest-growing jobs by 2030, emphasising technology-driven roles.

Fastest Growing Jobs by 2030

- **Fastest Growing Jobs by 2030:** Big Data Specialists, FinTech Engineers, AI and Machine Learning Specialists, Software and Application Developers, and Security Management Specialists.
- **Other High-Demand Roles:** Data Warehousing Specialists, Autonomous and Electric Vehicle Specialists, UI/UX Designers, Light Truck/Delivery Services Drivers, and IoT Specialists.
- **Skills in demand**, with AI & Big Data (87%) and Cybersecurity (70%) leading, while **Manual Dexterity** saw a **24% decrease**, and **Attention to Detail** increased by **12%**. Creative Thinking & Resilience also grew by 66%.
- **Key Drivers of Job Growth:** Digital access and technological advancements (**AI, big data**); Economic shifts like **geopolitical tensions** and **climate change**; **Green transition** and **automation's** impact on workforce restructuring.

Insights on India's Job Market

- Growth in AI, robotics, semiconductors, quantum computing, and encryption.
- Increased digital access and climate-mitigation technologies shaping job trends.
- **Top growing roles:** AI, Big Data, Machine Learning, and Security Management.

eCoO 2.0 System

- ❖ **Directorate General of Foreign Trade (DGFT)** launched the enhanced eCoO 2.0 system to simplify export certification, facilitating smoother trade & improving EoDB for Indian exporters.

Features of eCoO 2.0 System

- The eCoO 2.0 system is a **digital platform** aimed at simplifying the issuance of **Non-Preferential Certificates of Origin (CoO)**. It promotes digital authentication, reduces paperwork, and ensures faster processing of trade documents.
- **Multi-User Access:** Exporters can now authorize multiple users under a **single Importer Exporter Code**.
- **Aadhaar-based e-Signing:** Offers an alternative to **Digital Signature Tokens**, enhancing flexibility and security.
- **Integrated Dashboard:** Provides real-time access to eCoO services, **Free Trade Agreement (FTA)** information, trade events, and notifications.
- **In-lieu Certificate of Origin:** Allows exporters to request rectifications on previously issued certificates through an easy online application process.
- **High Processing Volume:** The system processes over 7,000 eCoOs daily and connects 125 issuing agencies, 110 chambers of commerce, and 650+ issuing officers.

Back-to-Back Certificate of Origin

- Issued for **goods not of Indian origin**, intended for re-export, trans-shipment, or merchanting trade.
- **Transparency:** Ensures accuracy by explicitly mentioning details of the origin and providing supporting documents from the foreign country of origin.
- **Simplified Process:** This initiative enhances processing speed and is especially beneficial for global supply chains involving intermediary trade through India.

- ⇒ **Speciality steel** refers to **high-performance steel alloys** with enhanced properties such as strength, corrosion resistance, or heat resistance, designed for specific applications.
 - ❖ **Examples:** Coated/Plated Steel, High Strength/Wear-resistant Steel, Specialty Rails, Alloy Steel & Wires, Electrical Steel including Cold-Rolled Grain-Oriented Steel (CRGO).
- ⇒ **Cold-rolled grain-oriented steel (CRGO):** High-value steel used in **production of power transformers** used in HT power distribution. As of now, **No Indian steelmaker has CRGO manufacturing tech.**

PLI Scheme 1.1 for Specialty Steel

- ❖ Union Minister of **Steel and Heavy Industries** launched the second round of **PLI scheme** for **Specialty Steel**, termed **PLI Scheme 1.1**.

Key Features of PLI Scheme 1.1

- Operates within the **original allocation of ₹6,322 crore**, implemented from **FY 2025-26 to FY 2029-30**.
- **Eligibility:** Companies investing in either new mills or augmenting existing capacities are eligible.

Major Changes Introduced

- **CRGO Steel Investment Threshold:** Reduced to **₹3,000 Cr**, capacity creation threshold of 50,000 tonnes.
- **Existing Capacity Augmentation:** Investment threshold reduced by 50% for capacity expansion.
- **Incentive Carry Forward:** Companies can carry forward excess production to offset future shortfalls.
- **Investor-Friendly Modifications:** Changes made based on industry feedback to boost participation.

Strategic Significance of the Scheme

- ✓ **Promotion of Value-Added Steel:** Encourages manufacturing of advanced steel grades domestically.
- ✓ **Import Reduction:** Helps reduce dependency on imports for **Specialty Steel**, contributing to Make in India and Atma Nirbhar Bharat.
- ✓ **CRGO Production:** Aimed at achieving self-reliance in **CRGO**, currently not produced domestically.
- ✓ **Tech Advancement:** Facilitates tech improvement & enhances India's position in global steel value chain.
- ✓ **Employment Generation:** Ensures job creation through new investments and capacity expansion.

Mutual Credit Guarantee Scheme

- **Eligibility:** MSMEs with a valid Udyam Registration Number.

- **Loan Coverage:** Provides **60% guarantee coverage** for loans up to Rs. 100 crore.
- Loans can cover **up to 75% of the project cost** for plant and machinery/equipment.
- Covers loans sanctioned within **4 years** from operational guidelines or until **Rs. 7 lakh crore** in guarantees are issued.
- **Initial Contribution:** Borrowers must deposit **5% of the loan amount** upfront.
- **Repayment Terms:** Upto **8 years** with a 2-year moratorium for loans **up to Rs. 50 crore**. **Flexible** repayment terms for loans **above Rs. 50 crore**.
- **Annual Guarantee Fee:** No fee during the year of loan sanction; 1.5% p.a. in subsequent 3 years; 1% p.a. thereafter.

Member Lending Institutions (MLIs)

- Scheduled Commercial Banks (SCBs), Non-Banking Financial Companies (NBFCs), and All India Financial Institutions (AIFIs) that register with the National Credit Guarantee Trustee Company Limited (NCGTC).

Impact on MSMEs

- **Collateral-Free Loans:** Facilitates access to debt capital for MSMEs to purchase machinery/equipment.
- **Manufacturing Boost:** Expected to accelerate manufacturing and contribute to the "Make in India" initiative, aiming to increase manufacturing sector's share to 25% of GDP.

Ramesh Chand Panel

- ❖ The government formed an expert panel headed by **NITI Aayog member Ramesh Chand** to develop a road map for switching to the **Producer Price Index (PPI)**.
- It will also oversee the revision of the **Wholesale Price Index's** base year to **2022-23** from **2011-12** to make the measure of factory-gate inflation more accurate. The panel will also suggest the **commodity basket** of **WPI** and **PPI** for the new base **2022-23**, considering structural changes in the economy.
- Separately, government efforts are underway to revise the base year for GDP estimation from 2011-12 to 2022-23. The last such revision was in 2015, when the base year was updated from 2004-05.
- Until the PPI stabilises, both WPI and PPI will run **concurrently**.

Why the shift?

- **PPI** differs from **WPI** because it measures the **average price change** producers receive and **excludes indirect taxes**. **PPI** also **removes** multiple **counting biases** inherent in **WPI**.
- **WPI** covers **goods, not services**, while a comprehensive **PPI** can track services.
- Using **PPI** would provide better determinants of the movement in the **national income deflator**.
- All major economies, including the US, China, Japan, Germany, France, and other G-20 countries, use **PPI** to measure the average price changes domestic producers receive for their output.

8th Pay Commission

- ❖ Union Cabinet has approved the constitution of the **8th Pay Commission** for revising salaries of **central government employees** and allowances of **pensioners**.

About Pay Commission

- **Appointment:** The **Central govt** sets up the Pay Commission to review the salary structure, allowances, and retirement benefits of govt employees, considering inflation, economic conditions & market rates.
- **Legal Status:** It is an **advisory body** with **no mandatory authority** for the government to accept its recommendations.
- **Frequency:** Pay Commissions are generally formed **every 10 years**; **first** one was established in **1946**.
- **Composition:** The Pay Commission operates under the **Department of Expenditure**, Ministry of Finance, and comprises experts in various fields.
- **Seventh Pay Commission:** Headed by **Justice A.K. Mathur**, it raised the **minimum salary to ₹18,000** and pension to ₹9,000, adding ₹1 lakh crore to the fiscal 2016-17 expenditure.during fiscal 2016-17.

Terms of Reference (ToR) of the 8th Pay Commission

- **Revision of Pay:** Recommend pay structure, salary, and allowances for central govt employees.
- **Addressing Pay Disparities:** Resolve grievances related to pay disparities across cadres & departments.
- **Market Parity:** Ensure pay and benefits parity with market standards for competitive compensation.
- **Pension and Retirement Benefits:** Improve pension schemes and suggest measures for adjusting pensions against inflation.
- **Economic Impact Analysis:** Propose salary and allowance revisions to boost consumption and support economic growth.
- **Stakeholder Consultations:** Engage with central and state governments and stakeholders before finalising recommendations.

Tobacco Board

- ❖ The **Tobacco Board of India** has focused on ensuring the growth and sustainability of the tobacco industry, with significant achievements in exports and farmer income.

Tobacco Board

- **Statutory body** established under the **Tobacco Board Act 1975**, operational since 1st January **1976**.
- Aims to promote the development of India's tobacco industry, primarily in Andhra Pradesh, Karnataka, and Tamil Nadu.
- Ensures fair pricing, regulation, and sustainable practices for tobacco cultivation and marketing.

Key Functions of Tobacco Board

- Regulates production, curing, grading & marketing of Virginia tobacco (Flue-Cured Virginia and Burley).
 - ⇒ **FCV (Flue-Cured Virginia)** and **Burley** are two types of tobacco varieties. **FCV** is known for its **light and mild** flavour, primarily used in cigarettes, while **Burley** is a type of **air-cured tobacco** with a stronger flavour, commonly used in **cigars** and other tobacco products.
- Issues licenses for growers, manufacturers, exporters, and dealers.

- Collaborates with research institutes to improve crop varieties and farming practices.
- Engages in market promotion, price stabilisation, and quality control.

India's Tobacco Production and Trade

- India is the **second-largest producer & exporter** of tobacco, following China & Brazil respectively.
- India contributes **10%** of global tobacco **acreage** and **9%** of total **production**.
- Tobacco grown on 0.45 million hectares (0.27% of India's net cultivated area), producing 750 million kg annually. India produces 300 million kg of FCV and 450 million kg of non-FCV varieties.

RBI Directives on Credit Score Redressal

- ❖ **RBI** has issued directives to ensure timely & accurate updating of credit scores by **Credit Information Companies (CICs)**, addressing growing customer complaints about delays & inaccuracies.

Credit Score

- A credit score is a **three-digit figure** (typically ranging from **300 to 900**) indicating a **borrower's creditworthiness**. A score of **750 or above** is considered **ideal**, improving the borrower's chances of securing loans on favourable terms.

Importance of a Good Credit Score

- ✓ A **high credit score** leads to **better loan terms**, including lower interest rates, faster approvals, and larger credit limits.
- A **low credit score** can result in loan rejection/higher interest rates, even after rectifying past defaults.

Credit Information Companies (CICs)

- CICs are authorised by RBI to collect, maintain, and report borrowers' credit information, helping lenders assess loan eligibility.
- **Major CICs in India:** **TransUnion CIBIL, CRIF High Mark, Equifax, and Experian.**
- CICs collaborate with banks and NBFCs to gather data, generate credit scores, and provide reports.

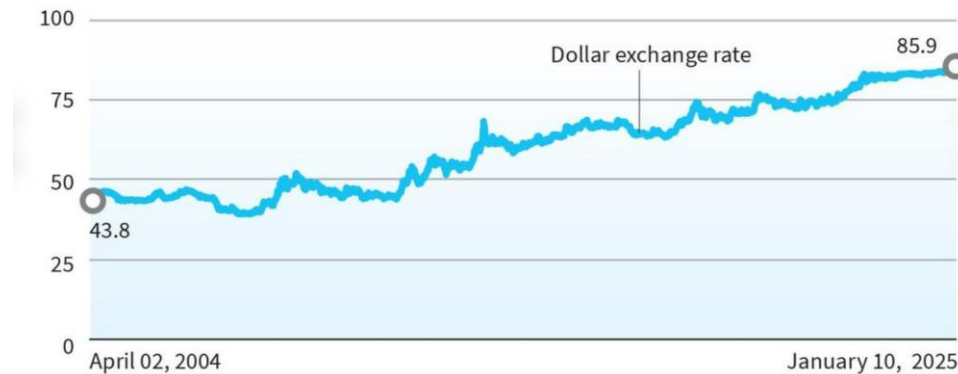
RBI-Directed Measures for Redressal

- ✓ Banks and NBFCs must pay **₹100 per calendar day** for unresolved **complaints beyond 30 days** and failure to update credit data **within 21 days of complaint receipt**.
- ✓ Credit data must be updated by banks & NBFCs **at least twice a month** or as per agreements with CICs.
- ✓ CICs and financial institutions must notify customers of complaint resolution status and provide clear reasons for **rejecting data correction** requests.
- ✓ CICs must send **SMS/email alerts** when a **credit report is accessed**, and banks/NBFCs must notify customers about **reported defaults or Days Past Due (DPD)**.

Rupee Weakening Against the Dollar

- ❖ **INR** recently saw **sharp depreciation** against **US dollar**, dropping to a new low of 85.81.

Chart 1: Chart shows the dollar exchange rate in India (in ₹)



Factors Contributing to the Weakening Rupee

- **Capital Outflows:** Foreign portfolio investors (FPIs) pulling funds out of Indian markets reduces the foreign currency supply.
- **Widening Trade Deficit:** A high import bill, especially for crude oil and gold, is a significant factor causing pressure on the rupee.
- **Rising Inflation:** A stronger real exchange rate, despite nominal depreciation, has increased domestic prices, counteracting potential export gains.

Exchange Rate Policy Framework

- **Nominal Exchange Rate:** Price of foreign currency in terms of domestic currency. Influenced by demand-supply conditions and central bank policies.
- **Real Exchange Rate:** Compares the relative prices of foreign goods with domestic goods. A lower real exchange rate can improve export competitiveness.

Types of Exchange Rate Regimes

- **Fixed Exchange Rate:** Central bank uses reserves to maintain a fixed rate.
- **Floating Exchange Rate:** Market-driven with no intervention.
- **Managed-Float:** Combines market forces & central bank interventions, seen in India's recent policies.

RBI's Exchange Rate Policy

- Since the 2010s, RBI has followed a **managed-floating exchange rate**.
- **Post-COVID Shift:** Between 2022 and 2024, the RBI took a **fixed exchange rate** approach, temporarily stabilizing the rupee with foreign exchange reserves.
- Recent policy reflects **managed float**, allowing the rupee to depreciate to ease pressure on reserves.

Implications of the Weakening Rupee

Positive Impact

- ✓ **Increased Net Exports:** Depreciation of the rupee makes domestic goods cheaper for foreign buyers, improving export competitiveness.

- ✓ **Real Exchange Rate Channel:** Exports benefit if nominal depreciation is accompanied by depreciation in real exchange rates.

Negative Impact

- **Reduced Export Competitiveness:** Rupee depreciation has **increased domestic prices, reducing the competitiveness** of exports and affecting the balance of payments by potentially widening trade deficit.
- **Higher Domestic Prices:** Depreciation leads to **costlier imports**, increasing production costs and potentially causing inflation.
- **Increased Variable Costs:** Firms face **higher costs** for **imported raw** materials, passing the burden onto consumers and causing price hikes.

Sebi's 'When-Listed' Platform

- ❖ SEBI plans a "**when-listed**" **trading platform** to curb grey market activities, enhance transparency, regulate informal trading, and protect investors.

Grey Market Trading

- **Grey Market:** It is an **unofficial market** where securities are traded before officially listed on stock exchanges, often driven by speculation.
- **Unofficial Pre-Listing Trading:** Grey market involves speculative buying and selling of IPO shares before official listing, operating without formal regulation.
- **Premium Fixing:** Operators set a premium on shares post-IPO closure based on market speculation.
- **Settlement:** Transactions settle on the official listing day, with gains or losses determined by the opening price of shares.

'When-Listed' Platform

- **Purpose:** SEBI's "when-listed" platform aims to reduce grey market trading by **allowing** shares to be **traded** between the **IPO allotment** and **official listing**, making this activity regulated.
- **Rationale:** Currently, unlisted shares are traded in the grey market, a non-regulated space, creating potential for risk and volatility.

Benefits of the 'When-Listed' Platform for Investors

- ✓ **Regulated Trading:** Investors can sell shares in a legitimate market instead of relying on grey market.
- ✓ **Transparency and Security:** The official platform eliminates the risks of informal, non-transparent trading, ensuring that Sebi monitors all trades.
- ✓ **Stability in Market Sentiments:** By reducing speculative grey market activity, the platform could lead to more stable price movements upon official listing.

Unnati Zero Coupon Zero Principal Bonds

- ❖ SEBI allowed the issuance of **Zero Coupon Zero Principal (ZCZP)** bonds on **Social Stock Exchanges (SSE)**, facilitating social enterprises to raise funds for **social welfare** initiatives.

What are Zero Coupon Zero Principal (ZCZP) Bonds?

- ZCZP bonds are **securities** issued by **non-profit organisations (NPOs)** listed on **SSE**.
- These bonds **neither pay interest nor return the principal** amount.
- The funds raised are considered **donations, not investments**, and are **non-refundable**.
- The bonds mature either after **12 months** or once the funded **project concludes**.

Features of Unnati ZCZP Bonds

- **SGBS Unnati Foundation**, an NPO, was the **first entity** to be listed on the National Stock Exchange's (NSE) Social Stock Exchange (SSE) with the issuance of ZCZP bonds worth Rs 2 crore.
- **Objective:** Training 10,000 underprivileged youth from govt colleges in 5 states (UP, MP, Karnataka, AP, TN) for employment.
- **Training Program:** 165 hours of training, with 90 hours classroom learning & 75 hours via a mobile app.
- **Fundraising Goal:** ₹2 crore with each bond **priced at ₹1**.
- **Minimum Issuance Size:** ₹1 crore for NPOs, **₹2 lakh minimum application** size.
- **Issuer:** SGBS Unnati Foundation, a not-for-profit organisation since 2011.
- **Minimum Subscription:** A min. of 75% of the target funds must be raised for the bond issue to proceed.
- **Issuance and Trade:** Issued in **demat form**, not tradable in secondary markets but transferable to heirs.
- **Market Scope:** For-profit ZCZP instruments can be listed on the main or SME platforms of the exchanges.
- **Transparency:** Funds raised must be used for the declared social project, with detailed disclosures required on usage and balance funds.

Benefits of ZCZP Bonds

- ✓ **Donation to Social Causes:** ZCZP bonds act as donations without expecting financial return.
- ✓ **Increased Visibility:** Listing on the **SSE** provides visibility and trust, enhancing access to regular funding.
- ✓ **Accountability:** Social enterprises must disclose how funds are utilised, ensuring accountability.

Science & Technology

India's Journey in Military AI

- ❖ India is advancing **AI integration in defence** but faces challenges in infrastructure and implementation.

Achievements in Military AI

- ✓ **Increased Defence Budget:** The **₹6.21 lakh crore (\$75 billion) defence budget (2023-24)** prioritises modernisation and AI integration for national security.
- ✓ **Indrajaal System:** Development of autonomous drone security systems like Indrajaal to bolster air defence capabilities.

⇒ **Grene Robotics** claimed to have designed and developed a **100% Indigenous** unified, distributed, and wide-area autonomous **drone defence dome** called **Indrajaal**. It can **autonomously** protect a large area of 1000-2000 sq. km per system against threats such as Unmanned Aerial Vehicles (UAVs), incoming weapons, loitering munitions, and the like.

- ✓ **Foreign Investment:** India has attracted significant investments, such as **Microsoft's \$3 billion** commitment to **AI infrastructure** in **Telangana**, aiding its AI ecosystem.
- ✓ **Government Initiatives:** The establishment of the **Defence Artificial Intelligence Council (DAIC)** and the **Defence AI Project Agency (DAIPA)** to guide AI adoption in military applications.

Central Cybercrime Suspect Registry

- ❖ India blocked fraudulent transactions worth Rs 1,800 crore in 90 days through the **Central Cybercrime Suspect Registry** under **I4C**, with **RBI** directing banks to adopt it for fraud prevention.

Indian Cyber Crime Coordination Centre (I4C)

- **Establishment:** Set up under the **Ministry of Home Affairs**, located in New Delhi.
- Coordinates efforts against cybercrime, collaborating with law enforcement and financial institutions.
- Focuses on R&D and prevention of cybercrimes, including misuse by extremist/ terrorist groups.

Central Suspect Registry under I4C

- **Data Source:** Based on the **National Cybercrime Reporting Portal (NCRP)** holds data on 1.4 million cybercriminals linked to financial frauds.
- **Registry Access:** Available to states, UTs, central investigation agencies, and financial institutions for better risk management.

Cyber Fraud Mitigation Centre (CFMC)

- **Launch:** Established at I4C with representatives of major banks, Financial Intermediaries, Payment Aggregators, Telecom Service Providers, IT Intermediaries, & States/UTs Law Enforcement Agencies (LEAs).
- It will work together for immediate action and seamless cooperation to tackle online financial crimes.

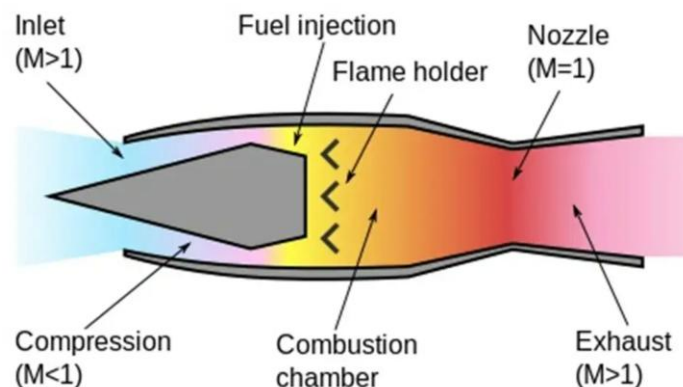
- CFMC serves as an example of "**Cooperative Federalism**" in law enforcement.
- ✓ **Impact:** Blocked 8.67 lakh **mule accounts**, 7 lakh SIM cards, and 1.4 lakh mobiles, demonstrating coordinated action across sectors.

⇒ **Mule Accounts** are the fraudulent bank accounts used for laundering illicit funds.

DRDO's Successful Scramjet Engine Ground Test

- ❖ India has successfully tested the **Supersonic Combustion Ramjet (Scramjet) engine**, marking a significant achievement in **hypersonic technology**.

Scramjet Technology



- A scramjet is an **air-breathing engine** that operates efficiently at **hypersonic speeds (Mach 5+)**, allowing supersonic combustion without moving parts.
- **Mechanism:** This mechanism utilises the vehicle's high-speed forward motion to compress incoming air for combustion, eliminating the need for onboard oxidisers.
- **Advantages:** Reduces vehicle weight, increases payload capacity, and enables sustained high-speed flight, making it ideal for hypersonic missiles and space launch systems.

Key Highlights of the Scramjet Engine Ground Test

- **Duration and Stability:** Achieved stable combustion for **120 seconds**, a **first in India**.
- **Flame Stabilization:** Implemented an innovative technique to maintain continuous flame at airspeeds exceeding 1.5 km/s.
- **Indigenous Fuel Development:** Defence Research and Development Laboratory (DRDL) developed an **endothermic scramjet fuel** that enhances cooling and ignition efficiency.
- **Thermal Barrier Coating (TBC):** Developed an advanced **ceramic TBC** with high thermal resistance, capable of operating beyond the melting point of steel, in partnership with Dept of Science & Tech (DST).

Strategic Significance

- **Enhanced Missile Capabilities:** The successful test opens the door to developing next-generation hypersonic missiles capable of evading advanced air defence systems.

- **Technological Self-Reliance:** Demonstrates India's indigenous capabilities in advanced propulsion systems, materials, and fuel technologies, reducing dependence on foreign technology.
- **Global Standing:** Positions India among a select group of nations, including the USA, Russia, and China, actively pursuing and achieving milestones in hypersonic technology.

India's Progress in Hypersonic Technology

- **Hypersonic Technology Demonstrator Vehicle (HSTDV):** DRDO **successfully flight-tested** the HSTDV, demonstrating the performance of a scramjet engine at **Mach 6 speeds**.
- **Hypersonic Wind Tunnel Facility:** Inaugurated by DRDO in **2020 in Hyderabad**, it can simulate speeds from **Mach 5 to 12**, making **India** the **third country** after US & Russia with such facility.

INS Surat, INS Nilgiri and INS Vaghsheer Commissioned

- ❖ Three major frontline combatants, **INS Surat**, **INS Nilgiri**, and **INS Vaghsheer**, were commissioned into the Indian Navy, marking a historic step enhancing India's maritime capabilities and defence production.



INS Surat: Advanced Guided Missile Destroyer (Project 15B)

- **Most advanced Stealth destroyer** with advanced strike capabilities & network-centric warfare features.
- Equipped with **surface-to-air missiles, anti-ship missiles, and torpedoes**.
- **First AI-enabled** warship in India, enhancing operational efficiency with indigenous AI solutions.
- Features state-of-the-art weapons and sensors for comprehensive defence.
- **Speed: Over 30 knots** (56 km/h) with a **Combined Gas and Gas (COGAG) propulsion system**.
- Part of **Project 15B**, developed by the Warship Design Bureau and built by **MDL, Mumbai**.
- Commissioned as the **fourth and final vessel of the class**.

INS Nilgiri: Advanced Stealth Frigate (Project 17A)

- **Multi-role, multi-mission frigate** designed for deep-sea operations in blue water.
- **Anti-surface, anti-air, and anti-submarine warfare capabilities**.

- Equipped with **supersonic surface-to-surface missile system** and **MRSAM system**; Features 76mm upgraded gun and **rapid-fire close-in weapon systems**.
- **First of seven ships** in the **Project 17A class**. Built by Mazagon Dock Shipbuilders Limited (MDL), Mumbai, and Garden Reach Shipbuilders & Engineers (GRSE), Kolkata.
- Integrates **“integrated construction”** philosophy, reducing overall build time.

INS Vaghsheer: Stealth Submarine (Scorpene Class, Project 75)

- One of the **world’s quietest diesel-electric submarines**, designed for anti-surface, anti-submarine warfare, armed with **wire-guided torpedoes, anti-ship missiles, and advanced sonar systems**.
- Can undertake a variety of missions, including **intelligence gathering, surveillance, special operations**.
- Future upgrades planned with **Air Independent Propulsion (AIP) technology** from 2026 for enhanced submerged endurance.
- Built in collaboration with the French Naval Group, designed under **Project 75**.
- Commissioned as the **sixth and final submarine** in the **Scorpene class**.
- Enhances India’s submarine capabilities with increased stealth and versatility.

Pralay Missile

- ❖ DRDO is set to showcase Pralay, **India’s first short-range quasi-ballistic missile for conventional strikes**, at the 2025 Republic Day parade.
- Pralay was conceptualized in **2015**.
- **Type:** Indigenous, short-range, **quasi-ballistic missile** developed by DRDO; Similar to Russia’s Iskander M and China’s Dong Feng 12.
- **Payload:** Capable of carrying warheads between 500-1,000 kg, enhancing strike versatility.
- **Capabilities:** Powered by a **solid-propellant rocket motor**, carrying conventional warheads.
- **Range:** 400 km, suitable for deployment along Line of Control (LoC) & Line of Actual Control (LAC).
- **Guidance System:** Equipped with advanced navigation & avionics.
- The Pralay missile is a **conventional missile**, which means it **can only carry a non-nuclear warhead** and is intended for tactical operations.
- The Pralay missile is not the longest-range surface-to-surface missile in terms of absolute range, but it is the **longest-range surface-to-surface missile** for **conventional military operations**.

Quasi-Ballistic Missiles

- They are a **hybrid of ballistic and cruise** missiles.
- **Flight Path:** Maneuvers mid-flight, flies at lower altitudes.
- **Stealth:** More difficult for missile defense systems to intercept.
- **Speed:** Travels at **hypersonic** speeds (Mach 5 or above).

Strategic Importance

- ✓ **Counterforce Capability:** Ideal for striking high-value enemy targets like missile silos, airfields, and logistics hubs.

- ✓ **Deterrence:** Strengthens India's defense posture and regional stability, especially in contested areas.
- ✓ **Indigenization:** Reflects India's growing self-reliance in advanced missile technology, highlighting the success of DRDO's efforts.

ISRO's CROPS

- ❖ ISRO has achieved the **successful germination** of at least three of the eight **cowpea cowpea seeds (Lobia)** in space under its **Compact Research Module for Orbital Plant Studies (CROPS)** experiment.

Highlights of the CROPS Mission

- CROPS, developed by **Vikram Sarabhai Space Centre (VSSC)**, is ISRO's **first biological experiment** to grow plants in space under **microgravity** conditions.
- Launched aboard **PSLV-C60 mission**, CROPS utilized the **PSLV Orbital Experiment Module (POEM)-4 platform** to cultivate cowpea seeds in a controlled environment with **active thermal management**.

POEM-4 Platform

- POEM-4 (PSLV Orbital Experiment Module-4) is a **microgravity research platform** repurposing the PSLV rocket's fourth stage.
- **Increased Capacity:** Three times more capacity than the previous POEM-3.
- **Payloads:** Includes 24 payloads focusing on robotics, sensors, and proof-of-concept technologies.
- **Components:** **Walking Robotic Arm (RRM-TD)** is an inchworm-like motion for inspection and servicing; **Debris Capture Manipulator** for space clean-up; **Gradient Control Reaction Wheel Assembly (RWA)** enhances attitude stabilisation.

Implication of POEM-4 and Collaborative Research

- ✓ **Payload Diversity & Public-Private Collaboration:** POEM-4 carried 24 payloads, including **experiments on plant cells & gut bacteria** by academic institutions (Amity University & RV College of Engg).

Significance of the CROPS Experiment

- ✓ **Understanding Microgravity Effects:** The experiment offers insights into **plant adaptation** and growth in a microgravity environment.
- ✓ **Sustainable Deep-Space Exploration:** Essential for developing **life-support systems** for long-duration missions, including Mars expeditions.
- ✓ **Advancing Astrobotany:** Establishes India's capability to grow food in extraterrestrial conditions, contributing to global research on space agriculture.

Third Launch Pad

- ❖ The Union Cabinet approved the establishment of the **Third Launch Pad (TLP)** at **ISRO's Satish Dhawan Space Centre** in **Sriharikota, Andhra Pradesh**.



- It will also serve as a **standby** launch pad for the **Second Launch Pad** at Sriharikota, enhancing the launch capacity for future **Indian human spaceflight** missions.
- It can support the **LVM3** vehicles with **Semicryogenic stage** and scaled up configurations of **Next-Generation Launch Vehicles**.
- Expected to be established within **4 years**.

Satish Dhawan Space Centre

- The SDSC is the country's **only spaceport** from which spacecraft and satellites are launched.
- It became operational in **1971**, with the flight of '**Rohini-125**', a small-sounding rocket, and was initially known as SHAR (Sriharikota Range). Currently, It has two launch pads.
- The **First Launch Pad (FLP)** was realised 30 years ago for **PSLV** and continues to support PSLV and SSLV.
- The **Second Launch Pad (SLP)** was established primarily for **GSLV** and LVM3 and functions as a PSLV standby. It has witnessed many successes, including the historical launch of the **Chandrayaan-3** mission and the upcoming **Gaganyaan** mission.

Geographic advantage of being closer to the equator

- The **surface velocity** of rotation **varies** from **point to point** on the Earth. It is about 1600 km per hour or about 460 meters in a second near the equator. It **gradually reduces** as we move to the **poles**.
- A satellite launched from sites near the equator in the east direction will get an **initial boost** (approximately 460 m/s) equal to the velocity of the Earth's surface.
 - ❖ **Why East?** The Earth rotates from **west to east** (anti-clockwise).
- The initial boost helps **reduce the cost** of rockets used to launch satellites. This is the major reason for launching satellites in the **eastward direction**.
- Also, Sriharikota is **sparsely populated**, reducing the damage risk of falling rocket parts post-launch.

Exceptions

- The above benefit applies **only** to satellites placed in **geostationary orbit** or that circle the Earth parallel to the equator. Such satellites are usually communication satellites or satellites used for scientific research.

- **Other satellites** are placed in **polar orbits**, moving across the equator in a **north-south direction**.
- Such satellites are generally launched **southward** or **northward** and cannot take advantage of the Earth's rotation. They are used mainly for mapping or spying.

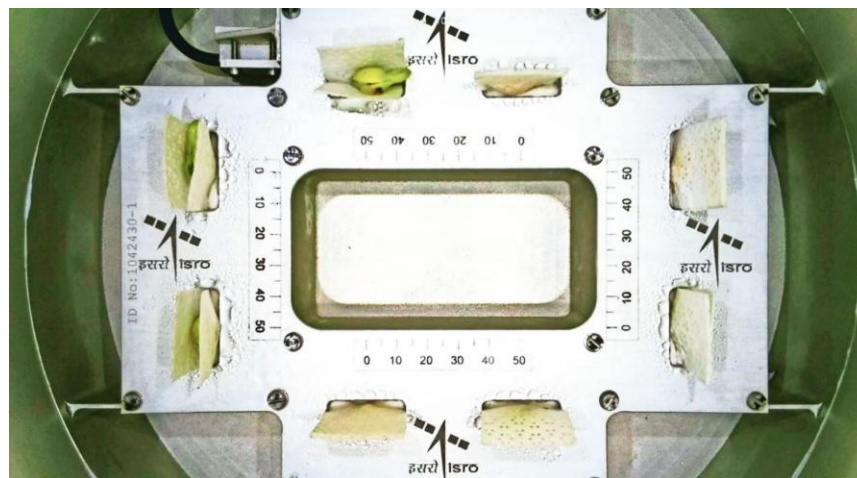
⇒ **Escape velocity** is the speed at which an object needs to be travelling to **break free** of a planet or moon's **gravity** well and leave it **without further propulsion**. For example, a spacecraft leaving the surface of Earth needs to be going 7 miles per second, or nearly 25,000 miles per hour, to leave without falling back to the surface or falling into orbit.

Farming in Space

- ❖ **ISRO's** successful experiment on **germinating lobia seeds** in space marks a milestone in space agriculture, part of the **CROPS** module.

Need to Grow Plants in Space

- ✓ **Sustainable Food Source:** Space-grown plants provide nutrition on long-term missions, reducing reliance on limited pre-packaged food supplies.
- ✓ **Oxygen Production:** Through **photosynthesis**, plants release oxygen, crucial for maintaining breathable air in spacecraft.
- ✓ **Recycling Systems:** Plants can recycle CO₂ and organic waste, creating a closed-loop life support system.
- ✓ **Mental Health:** Caring for plants reduces stress & improves astronauts' mental health during missions.



Methods of Growing Plants in Space

- **Hydroponics:** Plants grow in liquid solutions, receiving water and nutrients without soil. It is **commonly used** in space for its efficiency in water usage.
- **Aeroponics:** Plants are grown with roots suspended in air, using mist for nutrients. This reduces water and fertiliser usage and eliminates pesticides, making it efficient for space farming.
- **Soil-like Media:** This system simulates terrestrial soil by using materials such as highly porous clay pellets, retaining water and slowly releasing nutrients.

- **Veggie System:** The **International Space Station's** space garden, known as **Veggie**, uses hydroponics to grow various plants in a small space.

Challenges in Growing Plants in Space

- **Microgravity:** Lack of gravity prevents roots from growing downward and complicates water and nutrient absorption, as water sticks to surfaces in microgravity.
- **Radiation Exposure:** High radiation levels in space can damage plant DNA and impede growth.
- **Temperature Variations:** Extreme temperature fluctuations in space, often hundreds of degrees, require special insulation for plants.
- **Light Availability:** In outer solar system missions, the lack of sunlight challenges photosynthesis, leading to oxygen consumption rather than production.

ISRO's CROPS Experiment

- **Design:** The CROPS module functions like a **mini greenhouse** with **Earth-like conditions** in space.
- **Growing Medium:** Highly porous clay pellets are used, aiding water retention and nutrient release through slow-release fertilisers.
- **Light Simulation: Eight LEDs** (four warm, four cool) are used to mimic day-night cycles, with lights programmed to be on for 16 hours and off for 8 hours.
- **Temperature & Atmosphere Control:** The module's temperature is maintained between 20–30°C, with Earth-like atmospheric conditions.
- **Water Delivery:** Water is injected into the soil-like medium via an electric valve operated from Earth.
- **Results:** Lobia seeds sprouted on fourth day & leaves appeared on fifth, signaling successful germination.

Ideal Plants for Space Farming

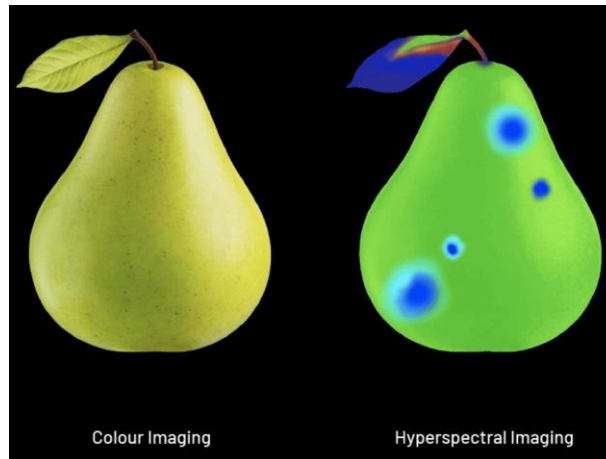
- **Leafy Greens:** Plants like lettuce, spinach, and kale are ideal as they grow quickly, require minimal space, and are rich in nutrients.
- **Legumes:** Beans & peas provide protein & can fix nitrogen; improve nutrient cycles in soil-like mediums.
- **Root Vegetables:** Radishes and carrots thrive in compact spaces, while wheat and rice are considered for long-term space sustenance.
- **Fruits:** Tomatoes and strawberries are suitable for space farming due to their size and nutritional value.

India's first private satellite constellation

- ❖ Google-backed India's space tech startup **Pixxel** achieved a milestone by launching three hyperspectral imaging satellites aboard a **SpaceX rocket**.
- The satellites aim to use hyperspectral imaging to capture highly detailed data across hundreds of light bands, serving industries such as agriculture, mining, environmental monitoring, and defence.
- The startup plans to add 18 more spacecraft to the six it has already developed.
- **Pixxel's hyperspectral imaging** satellites are uniquely designed to beam down data in hundreds of wavelengths to detect invisible problems to today's satellites.

- The constellation is designed to provide global coverage at a revisit of **every 24 hours**.

Hyperspectral Imaging (HSI)



- **Hyperspectral imaging (HSI)** is a technique that analyses a **wide spectrum** of light instead of just assigning **primary colours (red, green, blue)** to each pixel.
- The collected spectra form an image, with each pixel including a complete spectrum. Images are captured and analysed using **100s of wavelengths** rather than **10s of wavelengths**, as done **currently**.

ISRO's SpaDeX Mission

- ❖ **ISRO** successfully completed the docking of two satellites as part of the **SpaDeX mission**, thus making India the fourth country to dock satellites, after the **USA, Russia & China**.

About Space Docking Experiment (SpaDeX)

- **SpaDeX** is a cost-effective technology demonstrator mission that will demonstrate in-space docking using two small spacecraft ('**Chaser**' and '**Target**') designed to be launched from a **single PSLV** class vehicle and to dock at an altitude of about **700 kilometres**.
- **Objective:** SpaDeX mission aims to demonstrate rendezvous, docking, and undocking technologies, focusing on key technologies like electrical power transfer between the docked spacecraft, in-space robotics, and conducting payload operations after undocking.
- **First Experiment:** SpaDeX is ISRO's first satellite docking experiment.
- **Launch Details:** Launched on December 30, 2024, from **Sriharikota** by ISRO's **PSLV-C60**, placing two 220-kg satellites in a 475-km circular orbit.
- **Duration:** The mission will run for **2 years**.
- **Docking Process:** The spacecraft will **reduce the distance from 20 km to 3 m**.
- **Biological Research:** SPADEX will support biological studies on plant growth and bacteria, green propulsion systems and artificial intelligence labs in microgravity.

What is Orbital/Space Docking?

- Orbital docking is **joining two space vehicles** together **in space**. The docking process can be **temporary** or **semi-permanent**. For e.g., space station modules can dock with International Space Station (ISS).
- This process, whether **manned** or **unmanned**, allows those to operate as a single unit for critical tasks such as refuelling, repair, and crew exchange.

⇒ *The **first docking** was achieved in 1966 when **Gemini 8**, under the command of American astronaut Neil Armstrong, docked with Agena Target Vehicle (it was uncrewed).*

Technologies Involved

- **Sensor Suite:** Laser Range Finder, Rendezvous Sensor, and Proximity & Docking Sensors were used for precise measurements during the docking process.
- **SpaDeX A (Chaser)** is equipped with a high-resolution camera for monitoring & imaging, **SpaDeX B (Target)** carries a multispectral payload, radiation monitor & other scientific tools.
- **Robotic Experimentation:** Robotic arms will be validated for satellite servicing.
- **Docking Mechanism:** Androgynous, using identical systems on both satellites.
- **POEM (PS4 Orbital Experiment Module):** The **fourth stage** of PSLV will be **repurposed** to test critical in-orbit technologies, including docking and power transfer.
 - ❖ **CROPS mission** utilised the **PSLV Orbital Experiment Module (POEM)-4 platform** to cultivate cowpea seeds in a controlled environment with **active thermal management**.

About CROPS Mission

- CROPS Mission, developed by **Vikram Sarabhai Space Centre (VSSC)**, is **ISRO's first biological experiment to grow plants** in space under **microgravity** conditions.
- **Design:** The CROPS module functions like a **mini greenhouse** with **Earth-like conditions** in space.
- **Growing Medium:** Highly porous clay pellets aid water retention and nutrient release through slow-release fertilisers.
- **Light Simulation: Eight LEDs** (four warm, four cool) mimic day-night cycles, with lights programmed to be on for 16 hours and off for 8 hours.
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- **Water Delivery:** Water is injected into the soil-like medium via an electric valve operated from Earth.
- **Results: Lobia seeds** sprouted on 4th day & leaves appeared on 5th, signaling successful germination.

Indigenous Technologies Involved

- **Inter-Satellite Communication Link (ISL)** for autonomous communication.
- **GNSS-based Relative Orbit Determination Processor** for determining spacecraft positions & velocities.
- **Autonomous Rendezvous and Docking Strategy** developed for precise operations.

Mission Significance

- ✓ **Space Docking** is crucial for future space missions such as:
 - ❖ **Chandrayaan-4** for Moon sample return.
 - ❖ **Bharatiya Antariksh Station** planned for 2028.
 - ❖ **Satellite Servicing and Maintenance** to extend operational lifespans of satellites.
 - ❖ **In-space Robotics** and future satellite missions for resource monitoring.
- ✓ **Paves Way for the Third Launch Pad at Sriharikota:** Approved for the Next Generation Launch Vehicle (NGLV), supporting future space missions and enabling heavier satellite launches.
- ✓ **Enhanced Indian Position:** Only the **US, Russia & China** have successfully demonstrated space docking.
- ✓ **Precision and Coordination:** The SpaDeX mission demonstrates India's ability to control spacecraft at high velocities, which is essential for future deep space missions.
- ✓ **Self-Reliance:** The mission showcases India's growing space capabilities, moving closer to autonomous space operations.
- ✓ **Need for Space Weather Monitoring:** The mission underscores the importance of real-time space weather forecasts to ensure safe space operations, especially during solar maximum phases.

Impact of Solar Activity on SpaDeX

- ✓ **Favorable Solar Conditions:** The mission occurred during **solar cycle 25** with reduced solar disturbances, avoiding interference from **solar flares** and coronal mass ejections (CMEs), and fewer sunspots, ensuring smooth docking operations.
- **Space Weather Risks:** Solar flares and CMEs **can disrupt** spacecraft **operations**, blinding sensors and causing communication breakdowns.
- **Magnetic Storms:** High-speed solar winds can lead to positional errors, complicating docking.

Mission SCOT

- ❖ PM congratulated startup **Digantara** on success of **Mission SCOT (Space Camera for Object Tracking)**.
- **Core objective:** Precisely track and image **RSOs (Resident Space objects)** in the **Lower Earth Orbit**.
- **Launched by:** SpaceX's Falcon 9 (Transporter-12 mission)
- **Orbit:** Sun-synchronous orbit.
- **Supported by:** Aditya Birla Ventures and SIDBI.

⇒ *The first three satellites of the **Firefly constellation** by Bengaluru-based **Pixxel** and **ELEVATION-1**, a US-based Almagest Space Corporation satellite wholly designed and developed by Hyderabad-based **XDLINX Spacelabs**, were also onboard Transporter-12 rocket.*

Planet Parade Phenomenon

- ❖ A spectacular "**planet parade**" is currently **visible** in the night sky, with **six planets** forming a **striking arc**, providing a unique opportunity to understand planetary motions & celestial alignments.

What is a Planet Parade?

- A planet parade occurs when **multiple planets** are **simultaneously visible** in the night sky.

- It is an **informal term**, not a technical astronomical concept.
- Planets move differently across sky compared to stars & certain alignments make them visible at once.
- **Common Occurrence:** Planet parades are **not rare** but **don't occur annually**.
- **Past Event:** The last was in May-June 2024, featuring **all solar system planets** in the morning sky.

Characteristics of the Current Planet Parade

- **Visibility of the Planets:** **Venus, Saturn, Jupiter, & Mars** have been visible to the naked eye since December 2024, with **Mercury** joining after February 20, 2025. **Uranus** and **Neptune** require telescopes.
- **Formation of Arc:** The planets form an arc due to the solar system's plane.



How to Observe It

- **Optimal Conditions for Viewing:** Clear skies, low light pollution & observing a few hours after sunset.
- **Tools and Accessibility:** Affordable telescopes, binoculars, and user-friendly stargazing apps enhance visibility and make celestial observation accessible to enthusiasts.

⇒ **Distinguishing Planets from Stars:** *Planets shine steadily and are brighter, while stars twinkle due to atmospheric effects.*

DeepSeek's R1 Model

- ❖ The launch of **DeepSeek's R1 model** disrupted power stocks causing a major selloff in US power and utility stocks, as investors reassessed AI-driven electricity demand.

Factors for Projected Surge in Energy Demand

- **Rising AI Boom:** The number of global data centers is expected to grow from the current 9,000-11,000.
- **Increasing Share of Power Usage:** Data centers currently use 1-1.3% of global electricity, projected to double by 2026 to match Japan's total energy consumption.

Why does AI Consume High Energy?

- **GPU-Driven Computation:** AI models rely on thousands of GPUs housed in data centers, which consume enormous electricity.
- **Training vs. Querying:** Training large models like GPT-3 requires 1,300 MWh of electricity, equivalent to 1.6 million hours of Netflix streaming. Querying AI models also consumes 10-33 times more energy than a Google search.
- **Dependence on Fossil Fuels:** AI data centers are built in locations with readily available coal or natural gas-generated power due to stability issues with renewable energy.

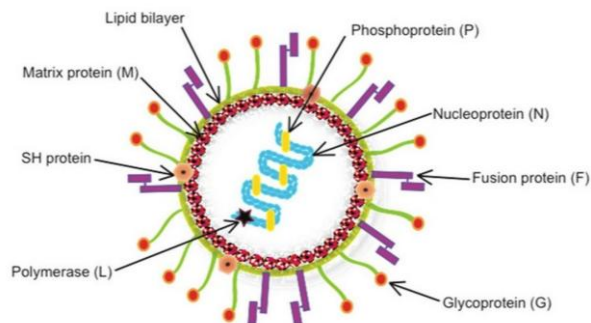
Why DeepSeek's R1 Model Disrupted Power Stocks

- Study finds Deepseek's **annual energy consumption** could reach 134 terawatt hours by 2027, equal to the Netherlands' electricity demand.
- ✓ But, R1 model uses only 2,000 GPUs compared to OpenAI's 16,000+, reducing electricity consumption.

Prelims Specific Topics

Human Metapneumovirus (HMPV)

- ❖ **Human Metapneumovirus (HMPV)**, a respiratory illness with symptoms like the **flu** and **COVID-19**, is spreading in China.



- HMPV is a **virus** that causes mild infections like a **common cold**. It was **first identified** in **2001** and is related to viruses like respiratory syncytial virus (RSV), measles, and mumps.
- HMPV can cause infections in the nose, throat, and lungs. It is more common in winter and early spring.
- Children, the elderly, and people with weak immune systems are more at risk.
- **Transmission:** Spreads through **direct contact** with someone who has it or from contaminated surfaces.
- **Signs and Symptoms:** Cough, Runny or blocked nose, Sore throat, Fever, and Wheezing, which usually appear **three to six days** after exposure.
- Most people get better on their own with home care. However, it can lead to bronchitis or pneumonia.

Risk Groups

- People younger than 5 years, especially **premature infants**, and those older than 65 are more at risk.

- People with weakened immune systems due to conditions like HIV, cancer, or autoimmune disorders, or because of medications that suppress their immune system, are more vulnerable.
- People with asthma or COPD (Chronic Obstructive Pulmonary Disease) are also at higher risk.

Corpse Flower

- ❖ The corpse flower named "**Putricia**" was recently at the Royal Botanic Gardens of Sydney for the first time in 15 years. IUCN Status – **Endangered**.

Why is it named Corpse Flower?

- The corpse flower (*Amorphophallus titanum*) is native to **Sumatra, Indonesia**.
- Its name comes from the Indonesian phrase "**Bunga bangkai**" and its scientific name translates to "**titanic misshaped penis**" in Ancient Greek.



Key Characteristics

- Flower can grow up to **3 meters tall**, featuring distinctive phallic spadix that emits an **odour resembling rotting flesh**.
- Has unpredictable blooming cycles, typically **flowering once every decade**, though some may bloom more frequently. Its distinctive smell serves a crucial purpose in **pollination** by attracting **carrion insects**.
- The corpse flower's odour is a complex blend of **volatile compounds**, including dimethyl disulfide (garlic), dimethyl trisulfide (rotting meat/cabbage), 3-methylbutanal (ripening cheese), and various sulfurous compounds.
- Currently, only about **300 corpse flowers remain in the wild**, with approximately 1,000 in cultivation.

Recent Discoveries of *Stellaria* Genus

- ❖ A new plant species, ***Stellaria bengalensis***, has been identified in **West Bengal**. Earlier, ***Stellaria mcclintockiae*** (species of same genus) was discovered in the Nelliampathy Hills of **Kerala**.

About *Stellaria bengalensis*

- It is an **annual herb** of the **genus *Stellaria***, belonging to the *Caryophyllaceae* family.
- Discovered at altitudes of 2,245-2,450 meters in the **Sangser forest, Kalimpong**, on muddy slopes.
- Characterized by **white flowers**, absence of bracts, and short petals included within the sepals.



- Produces **sharp, pointed seeds**. **India** hosts around **22 species of *Stellaria***, mostly in Himalayan region.

Belly Landing

- ❖ Recently, a **Jeju Air flight** made a **belly landing**, overran the runway, and burst into fire at the Muan International Airport in **South Korea**.



- A **belly landing** or **gear-up landing** occurs when an aircraft lands **without its landing gear** fully extended and uses its underside, or **belly**, as its **primary landing device**.
- A cockpit crew decides to land an aircraft on its belly in the following situations:
 - ❖ Landing gear **fails to deploy**.
 - ❖ A stricken aircraft **cannot reach** an **airport**, and landing is done in a field. The pilot considers skidding the aircraft to a stop safer than touching down on wheels.
 - ❖ **Ditching**: when an aircraft makes an emergency landing on water.
 - ❖ Any other situation a pilot considers a belly-landing safer than landing on wheels.

Aviation Terms in News

- **Landing long and fast**: It means an aircraft touches down far beyond the designated touchdown zone on the runway, leaving the crew with less runway length to stop the aircraft at a speed far exceeding the recommended landing speed.
- **Flaps**: Flaps are hinged surfaces on the trailing edges of an aircraft's wings. They increase the aircraft's lift and drag, allowing it to take off and land at lower speeds.
- **A stall**: A rapid loss of lift in an aeroplane occurs when airflow separates from the wing's surface. It happens when the wing's **angle of attack (AOA)** exceeds a critical value, called the stall angle of attack.
- **A slat**: Aerodynamic device on the leading edge of an aeroplane's wing that increases lift & improves flight safety. Slats are used during takeoff & landing and when performing low-speed manoeuvres.

BHARATPOL portal

- ❖ The **BHARATPOL** portal by the Central Bureau of Investigation (CBI) will be launched.

- The portal will streamline **processing all requests** for international assistance through INTERPOL, including issuing **INTERPOL Notices**.
- CBI is the **National Central Bureau** (NCB-New Delhi) for **INTERPOL** in India.
- Through the portal, the country's law enforcement agencies will be able to access real-time information

Discovery of Dinosaur Highway

- ❖ Scientists discovered over **200 dinosaur footprints** in Oxfordshire, dating back 166 million years to the **Middle Jurassic period**. The site, known as the "**dinosaur highway**," provides key insights into ancient dinosaur behaviour.

Significance of the Discovery

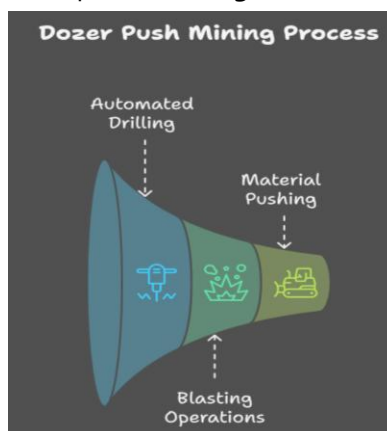
- ✓ **Megalosaurus Footprint:** The **Megalosaurus** footprint is notable as 2024 marks 200 years since William Buckland's pioneering study in 1824, which initiated modern dinosaur research.
- ✓ **Size Variations:** **Sauropod** footprints showed varying sizes, indicating that adult and juvenile dinosaurs were **walking**, not running, in a herd.
- ✓ The discovery is part of ongoing efforts to study the **prehistoric past**, with further research likely to uncover more details about the lives of dinosaurs.

Challenges in Dinosaur Footprint Preservation

- **Fragile Nature:** Dinosaur footprints are highly fragile and vulnerable to environmental damage.
- **Mining Activities:** Quarrying activities, if not carefully monitored, can lead to the destruction of such footprints and other fossil records.

Dozer Push Mining Method

- ❖ CSIR-Central Institute of Mining and Fuel Research (**CSIR-CIMFR**) has conducted the **first trial blast** for the **Dozer Push Mining Method** at Coal Mine in Ambikapur, **Chhattisgarh**.



- The project's primary objective was to develop a method that **optimises the mining process** and ensures that vibration and fly rock are controlled within **safe limits**.
- It introduces a paradigm shift by utilising **unmanned, automated machinery** for mining operations.
- It offers a viable alternative to conventional truck shovel mining or shovel-dumper and dragline methods.

- It provides advantages such as improved efficiency by enabling faster coal recovery and reducing delays caused by adverse weather conditions such as the monsoon season.
- It is cost-effective, with an estimated 7-10% reduction in operational costs compared to conventional.
- Moreover, the unmanned operation of the Dozer Push Mining method greatly enhances worker safety.

DRS Technology in Cricket

- ❖ Yashasvi Jaiswal's controversial dismissal at the MCG reignites debates about the reliability and accuracy of **DRS technologies**.

⇒ **DRS (Umpire Decision Review System)** refers to a **technology-based** system used in cricket to assist umpires in making accurate decisions, particularly when the on-field umpires are uncertain. It allows players to challenge on-field decisions which are reviewed using various technologies.

Key DRS Technologies

- **Snicko (Snickometer):** Detects sound patterns (or 'snicks') when the bat contacts the ball, helping identify whether a batsman has edged the ball. Detects edges through audio waveform patterns using resonance filters and an oscilloscope.
- **Hot Spot:** Uses infrared thermal imaging to detect heat signatures when the ball touches the bat or pad.
- **HawkEye:** A ball-tracking technology is used to predict the ball's trajectory, mainly for LBW (Leg Before Wicket) decisions. It provides a 3D simulation of the ball's path.

ILO Report on International Migrant Workers

- ❖ The International Labour Organisation's (ILO) 2025 "**Global Estimates on International Migrant Workers**" highlights labour market trends and migrant contributions to the global economy.

Key Findings

International Migrant Workers in the Global Labour Force

- International migrants (IMs) represented **4.7%** of the global labour force in 2022, totalling 167.7 million workers. This is an increase of 30 million compared to 2013.
- IM men constituted 4.7% of male employment, and IM women 4.4% of female employment globally.
- **Unemployed IMs:** 12.1 million.
- Growth rate of IMs dipped to **less than 1% annually** between 2019-2022, largely due to the pandemic.

Age and Gender Distribution

- 74.9% of IMs were prime-age adults (25-54 years), totalling 125.6 million.
- 9.3% were young workers (15-24 years), numbering 15.5 million.
- IM women's participation in the labor force is increasing, although they face higher unemployment (8.7%) than men (6.2%).

Economic Sectors with High IM Representation

- **68.4%** of IMs worked in the **services sector**, particularly in the **care economy**.
- **Women** made up **80.7%** of IMs in services, compared to 60.8% of men.
- 24.3% of IMs worked in industry, and 7.4% were in agriculture.

Top Host Countries for International Migrants

- **High-income countries** absorbed **68.4%** (114 million) of IMs, mainly in services.
- **Upper-middle-income countries** hosted **17.4%** (29.2 million).
- Major regions: **Northern, Southern, Western Europe** (23.3%), and **North America** (22.6%).
- **Arab states** hosted **13.3%** of IM workers.

Kashmir's Pashmina: Heritage of 'Soft Gold'

- ❖ Highlighting the cultural and technological significance of **Kashmir's Pashmina**.

Pashmina

- **Pashmina** is a **fine fabric** (finer than 16 microns, ensuring exceptional softness and warmth) made from the undercoat of the **Changthangi goat**, primarily found in **Ladakh**.
- **Etymology:** Derived from the Persian word "**Pashm**," meaning **soft wool**.
- **Unique Qualities:** Lightweight, soft, warm, breathable, and durable.
- **GI Tag:** Kashmir's Pashmina holds GI certification for its traditional production methods.
- **Testing Authenticity: "Ring Test"** checks fineness of shawl by sliding it through a standard finger ring.
- **Threats:** Mass-produced imitations undermine artisans; Climate change affects goat populations.
- **Storage and Preservation:** Use breathable cotton or muslin bags in cool, dry places. Wash with mild detergent; air dry flat to maintain shape.
- **Innovations:** Blends with silk and modern designs aim to attract younger buyers.

Production Steps

1. **Harvesting:** Undercoat shed naturally during spring is collected.
2. **Sorting:** Guard hairs manually removed by women artisans.
3. **Spinning:** Hand-spun on traditional wheels to produce fine yarn.
4. **Weaving:** Intricately crafted on traditional handlooms.
5. **Dyeing:** Natural dyes from plants and minerals enhance colours.

Types and Varieties of Pashmina

- **Pure Pashmina:** Finest cashmere wool, unblended.
- **Silk Pashmina:** Wool-silk blend in an **80:20 ratio** for enhanced sheen.
- **Kani Pashmina:** Intricate patterns woven using small **wooden needles (Kanis)**.
- **Regional Variants:** **Changthang Pashmina** has Ultra-fine fibres sourced from goats at 13,000–18,000 ft altitude. **Tibetan Pashmina** is slightly coarser but still premium.

Significance of Pashmina Shawls

- ✓ **Historical Legacy:** Dates back **over 3,000 years**; prized by emperors and European aristocracy.
- ✓ **Cultural Role:** Used in **ceremonial shawls** and **heirlooms** in Kashmir.
- ✓ **Economic Significance:** Livelihood for Himalayan communities, sustaining traditional craftsmanship.

Kookaburras

- ❖ The **Border-Gavaskar Trophy (BGT)**, which **Australia won** for the **first time** since 2014-15, saw pacers set the tone with a significant role of **Kookaburra cricket balls**.
- It is **bowler-friendly**, unlike the white balls used for limited-overs cricket, which offer less swing.
- **Extra lacquer** was applied to ensure the ball stayed **harder for longer**, which meant longer seam movement. The **ridge**, sitting below the seam's stitches, helps it stay intact for longer.

Boxing Day Test

- A cricket Test match was held in **Melbourne, Victoria, Australia**, involving the Australian national cricket team and an opposing national team touring Australia during the southern summer.
- It begins annually on **Boxing Day** (26 December).

Kurukop echo

- ❖ Study suggests a distinct echo "**Kurukop echo**" attracted ancient artists to one site.
- Kurukop, is in **Nama Karoo region** of **South Africa's** Northern Cape province.
- The geological formation began to accumulate about **300 million years ago**, before the breakup of the supercontinent Gondwanaland.



- This **eroded sandstone hill**, transformed by **volcanic activity**, is marked with 112 **petroglyphs** (rock engravings) depicting various **figures** like eland, elephants, zebras, ostriches, wildebeest, rhinoceros, and animal-human hybrids.
- The depictions were made by hunter-gatherer **San** and **Khoe herder** people who may have visited Kurukop repeatedly astonished by echo in the area.

⇒ The **Impulse Response Technique** is a method for measuring the response of a system to a sudden input, or impulse. It's used in many fields, including acoustics, audio, and control systems.

QS World Future Skills Index

- ❖ **India ranks 2nd** for **Digital Skills** in the **QS World Future Skills Index**, only behind the **United States** and ahead of **Canada & Germany**.

Key findings

- Countries like the USA, UK, Germany, Australia, and Canada, among others in the top ten, have been categorised as “**future skills pioneers**”.

Skills Fit		Academic Readiness		Future of Work		Economic Transformation		INDIA																		
Country	Score	Country	Score	Country	Score	Country	Score																			
UK	100.00	UK	100.0	United States	100.0	South Korea	100.0	<table border="1"> <thead> <tr> <th>Indicator</th> <th>Skills Fit</th> <th>Academic Readiness</th> <th>Future of Work</th> <th>Economic Transformation</th> <th>Overall</th> </tr> </thead> <tbody> <tr> <td>Score</td> <td>59.1</td> <td>89.9</td> <td>99.1</td> <td>58.3</td> <td>76.6</td> </tr> <tr> <td>Global position</td> <td>37th</td> <td>26th</td> <td>2nd</td> <td>40th</td> <td>25th</td> </tr> </tbody> </table>	Indicator	Skills Fit	Academic Readiness	Future of Work	Economic Transformation	Overall	Score	59.1	89.9	99.1	58.3	76.6	Global position	37th	26th	2nd	40th	25th
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Canada	90.9	Netherlands	99.3	Mexico	98.2	United States	97.9																			
Germany	89.2	Australia	98.9	Canada	97.4	Switzerland	96.8																			
Netherlands	88.6	United States	98.6	Australia	96.5	Japan	95.8																			

- Overall, India ranked **25th** (“**future skills contender**”) across all indicators, including the **alignment between skills and employer needs, academic readiness, and economic transformation**.

QS World Future Skills Index

- A global ranking system evaluating countries’ readiness to meet future job market demands through skill development, education, and economic transformation.
- **Released by:** Quacquarelli Symonds (QS), a London-based organisation.
- **Aim:** To assess how countries prepare their workforce for future skills like coding, cybersecurity, data analysis, digital competencies, AI, green technologies, and sustainability.

Rural Community Immigration Class (RCIC) Scheme

- ❖ **Canada** has introduced the **RCIC Scheme**, offering opportunities for international students.
- Launched by **Immigration, Refugees and Citizenship Canada (IRCC)** in December 2024.
- It aims to address **labour shortages** and promote **development** in smaller **rural communities** by attracting individuals willing to **settle long-term** in these areas.
- Will benefit students with near-expiration **post-graduation work permits (PGWPs)** with lower **Comprehensive Ranking System (CRS)** scores for permanent residency (PR) or secure a high-paying job.
- Now, they can apply for PR if they **commit** to living and working in **designated rural communities**.
- These are smaller towns in rural areas near larger regions like Ontario, Vancouver, and others.
- It benefits **Indian students**, who constitute the **largest share** of international students in Canada (nearly 40%) and face challenges transitioning to PR due to increased competition and stricter requirements.

Water sprout in Jaisalmer

- ❖ **Rajasthan’s Jaisalmer** witnessed **water gushing out** from underground. It is being attributed to an “**artesian condition**”.
- Scientists believe this water is millions of years old and not linked with the **Saraswati** River.

What are artesian conditions?

- “**Artesian**” is when water is “**confined under pressure**” below layers of **relatively impermeable** rock.
- When a **rupture** (like drilling) happens, underground pressure forces water upward toward land.

What happened in Jaisalmer?

- Here, the water is confined underneath a geological layer of **sandstone**. As soon as the top layer is **punctured** during **borewell drilling**, water starts flowing upwards due to heavy pressure.
- A small amount of non-inflammable gas was released along with the water.
- Earlier, such incidents occurred in surrounding areas, however not to this scale. Similar incidents have also been spotted in the desert regions of **Australia** and **Africa**.

Winter Foods in News

- ❖ From Kashmir to Kerala, each region brings forth a unique **winter culinary** tradition.

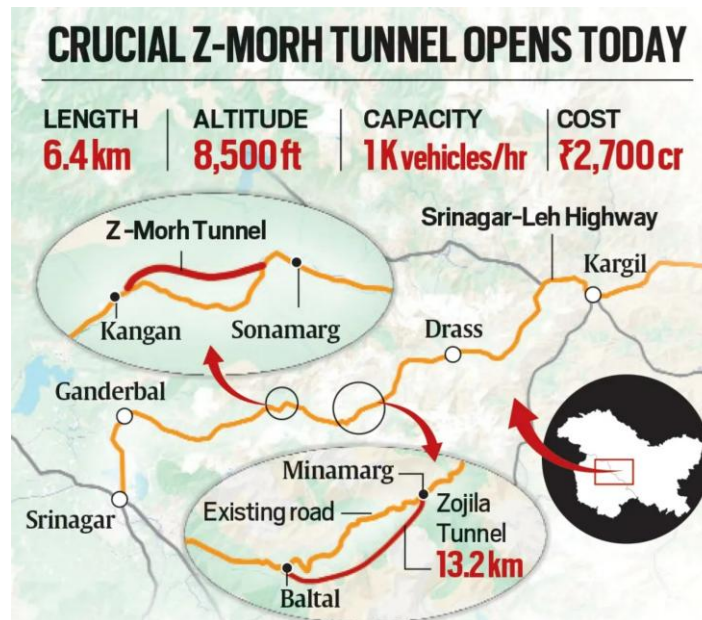
Dish	Details
Harisa of Kashmir	<ul style="list-style-type: none"> • Slow-cooked mutton porridge with spices and thickened with rice or wheat. • Derived from the Arabic word haris, meaning “to pound,” harisa carries the culinary influence of Central Asia. • Brought to Kashmir by Afghan rulers.
Panjeeri of Jammu and Pinni of Punjab	<ul style="list-style-type: none"> • Ghee-laden, nutrient-dense treats made with whole wheat, jaggery, and nuts are quintessential winter companions.
Methi Pak of Gujarat	<ul style="list-style-type: none"> • Prepared with fenugreek, jaggery, dried fruits, and medicinal properties. • Often gifted to new mothers, it is revered for its ability to boost immunity and provide warmth.
Til Pitha of Assam	<ul style="list-style-type: none"> • A delicate rice crepe filled with sesame and jaggery. • Graces the festivities of Magh Bihu
Tilkut of Bihar	<ul style="list-style-type: none"> • Specially made and eaten during Sakraat or “Makar Sankranti” festival. • It is made of pounded ‘til’ or sesame seeds and jaggery or sugar. • Reference to this dry sweet is found in the Buddhist literature as Palala.
Pepper rasam of Tamil Nadu	<ul style="list-style-type: none"> • Tangy, spicy soup made with black pepper, tamarind, ginger, and lentils is a comfort food and an Ayurvedic remedy. • The word “rasa”, meaning “essence,” captures its essence—a dish that soothes, nourishes, and revitalises.
Chhang of Sikkim & Arunachal Pradesh	<ul style="list-style-type: none"> • Traditional fermented millet or barley drink—offers respite from the biting cold. • Chhang is enjoyed during festivals and gatherings.
Beetroot Thoran of Kerala	<ul style="list-style-type: none"> • Stir-fried dish made with beetroot, grated coconut, and spices. • Not exclusive to the season, but best made using winter’s freshest produce.

Malaiyo of Benaras, **Ni-mish** of Lucknow, Daulat ki chaat of Delhi

- Frothy, cloud-like desserts churned from milk foam and flavoured with saffron.
- Malaiyo has a special twist of banana and pine nuts.
- Daulat ki Chaat is also mentioned in **Shahjahanama**.

Z-Morh Tunnel

- ❖ The **Z-Morh Tunnel** in **Jammu and Kashmir**, recently inaugurated by PM, enhances year-round connectivity between **Srinagar** and **Sonamarg**, with strategic implications for the **Ladakh** region.



Technical Specifications

- **Location:** 6.5 kilometres, Two-lane bi-directional road tunnel with a 10-meter width, Situated on the **Srinagar-Leh National Highway (NH-1)**, approximately 2,637 meters (8,650 feet) above sea level.
- **Safety Features:** Parallel 6.426 km escape tunnel gives an advanced ventilation system.
- **Construction Techniques:** Construction used **drill-and-blast methods with ANFO explosives** for excavation, alongside the **New Austrian Tunneling Method (NATM)** for tunnelling.
- **Altitude Challenges:** Constructed at high altitudes, addressing issues like heavy snowfall and avalanches.
- **Traffic Capacity:** Designed to handle up to 1,000 vehicles per hour at speeds up to 80 km/h.

Significance of Z-Morh

Strategic Importance

- **All-Weather Connectivity:** Ensures uninterrupted movement in the Ladakh region.
- **Defense Significance:** Enhances logistical support and troop mobility to border areas, strengthening India's defence capabilities.
- **Complementary Infrastructure:** Part of a broader project including the under-construction 14.2 km Zojila Tunnel, aimed at providing year-round access to Ladakh.

Economic and Tourism Impact

- **Tourism Development:** Transforms **Sonamarg into a year-round destination**, promoting winter tourism and adventure sports
- **Economic Growth:** Boosts local livelihoods by improving access and attracting regional investment.

Great Bitter Lake

- ❖ The **Great Bitter Lake** is a crucial water body in **Egypt** located along the **Suez Canal**, which serves as a passage for international maritime trade.



Location and Geography

- Situated in Egypt, spanning **approximately 60 km²**, the Great Bitter Lake is a **saltwater lake** between the **Mediterranean Sea** and the **Red Sea**, connected to both seas through the Suez Canal.

Historical Significance

- **Pre-Canal History:** The site was **originally a dry salt valley** before the construction of the Suez Canal.
- **Ancient Connections:** Evidence of trade routes via the Suez Canal dates back to the **era of Pharaoh Senausret III**, suggesting the region's historical significance for maritime commerce.

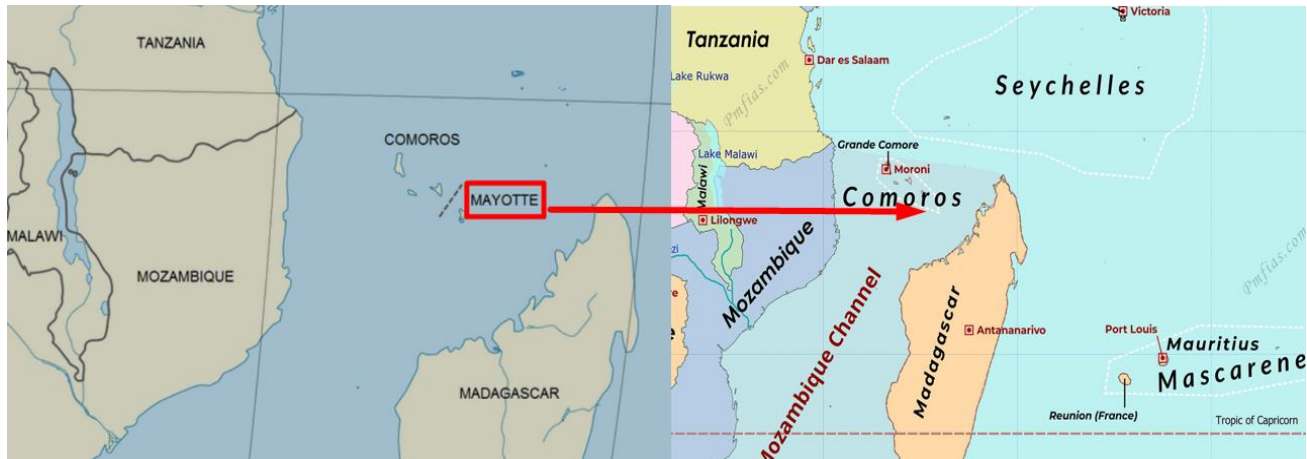
Importance of Great Bitter Lake

- ✓ **Suez Canal Expansion:** The canal's development, including the Great Bitter Lake, involves **advanced dredging techniques**, creating a wider and deeper passage to accommodate modern, larger vessels.
- ✓ **Global Trade:** The Suez Canal, with the Great Bitter Lake as a key component, **shortens the maritime route** between Europe and Asia by **up to 7,000 kilometres**, boosting international trade.
- ✓ **Strategic Importance:** The lake is a **staging area for ships** travelling through the Suez Canal, where vessels can **adjust their positions** or wait for passage.
- ✓ **Traffic Management:** It helps manage the **traffic flow** in the narrow canal, allowing ships to pass safely and efficiently, especially in the event of congestion.

- ✓ **Key Role in Oil Transport:** It is also vital for **oil** and **gas shipping**, with a significant percentage of global petroleum passing through the Suez Canal annually.

Mayotte

- ❖ **Tropical Cyclone Dikeledi** (Jan 2025) struck **Mayotte**, a **French territory** in the **Indian Ocean**, causing severe flooding and displacing 14,500 people.
- ❖ It followed Tropical Cyclone **Chido** (Dec 2024), the **strongest storm in 90 years**, which devastated Southeast Africa with 260 km/h winds, killing 39 and displacing thousands.



- Mayotte is in the **Mozambique Channel**, part of the **Comoros Archipelago** in the Indian Ocean.
- **Comprises two islands:** Grande Terre (main island) and Petite Terre.
- **History:** Colonized by France in 1843. Mayotte **remained French** following a **1974 referendum** when other Comoros islands gained independence.
- **Present Status:** A French overseas department and the **poorest territory of France** and the EU.

Rottneest Island

- ❖ Recent seaplane crash near **Rottneest Island, Australia**.
- ❖ **Cessna 208 Caravan involved in the Incident:** Single-engine **turboprop**, commonly used for **passenger** and **cargo transport**, is a seaplane variant equipped for water takeoffs and landings.

About Rottneest Island

- Known as **Wadjemup** to the **Whadjuk Noongar people**, holding **cultural significance**.
- **Proximity to Mainland:** Located 19 km off the coast of **Fremantle**, near **Perth, Western Australia**.

Significance of Rottneest Island

- **Historical Use:** Served as an internment camp during World War I and a defense base in World War II.
- **Tourism:** Popular for snorkeling, cycling, and wildlife observation, especially quokka sightings.
- **Quokka Habitat:** Home to the **Quokka (*Setonix brachyurus*)**, a **rare marsupial** on the mainland.

- **Marine Environment:** Features 63 beaches and 20 bays, supporting over 135 species of tropical fish and various coral species.

Quokka



- **Physical Appearance:** Small, **herbivorous marsupial** with a round, compact body, short fur, and a distinctive smile-like expression. Its fur is typically brown-grey with lighter patches on the belly.
- **Behaviour:** Quokkas are **nocturnal**. They are known for being **social** and **curious**, often approaching humans for food, though they are not aggressive.
- **Habitat:** Native to Australia, quokkas are primarily found on Rottnest Island, with a small population on the mainland in bushland areas. They thrive in shrubland and woodlands, often near water sources.
- **Conservation Status:** IUCN: **Vulnerable**
- **Threats:** Habitat loss, predation by introduced species, and limited distribution.

Renaming of North America's Highest Peak

- ❖ President Trump's executive order mandates renaming of North America's highest peak, reversing the Obama-era decision to call it Denali, citing historical significance of **President McKinley**.
- ❖ Denali National Park and Preserve retains its name despite the mountain's renaming.

President William McKinley

- Served as the **25th President** of the **United States (1897–1901)**.
- Led the country during the **Spanish-American War (1898)**, resulting in U.S. acquisition of territories like Puerto Rico, Guam, and the Philippines.
- Advocated for **protective tariffs** and the **gold standard**, promoting economic growth.
- Assassinated in 1901, making **Theodore Roosevelt** his successor.

Historical Name Changes

- **Original Name:** Denali, used by indigenous Koyukon people, in their Athabascan language.
- **1897:** Named **Mount McKinley** by a gold prospector to honor President William McKinley.

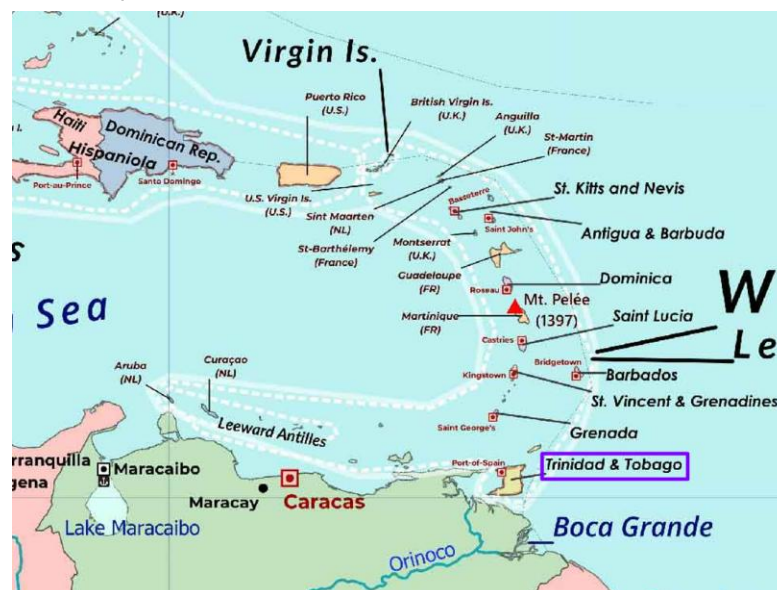
- **1917:** Federal recognition of the name Mount McKinley.
- **1980:** Name changed to **Denali** by Alaska state, but not accepted federally until 2015.
- **2015:** Obama administration renamed the peak Denali, honoring indigenous heritage.

Geographical and Ecological Significance

- **Location:** In the Alaska Range, Alaska, USA.
- **Height:** Stands at 20,310 feet (6,190 meters) above sea level, the highest point in North America.
- **Ecology:** The surrounding Denali National Park and Preserve hosts diverse ecosystems, including tundra, glaciers, and mountain forests.

{Prelims – PIN World – SA} State of Emergency in Trinidad and Tobago

- ❖ **Trinidad and Tobago** declared a state of **emergency** following a deadly weekend of violence.
- Threatened public safety due to a **wave of reprisal attacks**, with heightened **criminal activities** in urban areas; however, **no curfew** has been imposed.



Reasons Behind the Violence

- Increased **gang violence** and **retaliation killings** were reported, with armed gunmen attacking known gang leaders and engaging in mass shootings.
- A **surge in the use of high-calibre firearms**, including high-velocity assault weapons, largely imported from the US, exacerbates the violence.

Major Dhyan Chand Khel Ratna Award

- ❖ The govt announced the major **Dhyan Chand Khel Ratna Award 2024** awardee.
- **D Gukesh** (Chess), **Manu Bhakar** (Shooting), **Harmanpreet Singh** (Hockey), and **Praveen Kumar** (Para-athletics) are recipients of this award.
- It was formerly known as the Rajiv Gandhi Khel Ratna Award and is the highest sporting honour in India.

- It is awarded **annually** by the **Ministry of Youth Affairs and Sports**.
- The award is personally bestowed upon recipients by the **President of India** during the ceremony. No proxies are allowed to receive the award or prize money.

Criteria

- The award is given for exceptional performance in sports over the previous **four years**. Achievements in the Olympic Games, Asian Games, Commonwealth Games, and World Championships are considered.
- A maximum of **two sportspersons** can be **nominated** for each sport discipline.

⇒ *Sportspersons who have been **penalised** for the use of drugs/substances banned by the **National Anti-Doping Agency (NADA)** and tested by the **National Dope Testing Laboratory** or any other **World Anti-Doping Agency (WADA)** accredited laboratory shall be **eligible** to be considered for the award after completion of their sentence/penalty/suspension/ban period. The achievements during the said suspension/ punishment would **not be considered**.*

Selection Process

- **Nominations:** Nominations are invited through an **online portal**, and sportspersons can self-apply. The government can also nominate up to two sportspersons in deserving cases.
- **Verification:** **Sports Authority of India** verifies the achievements & performance records of nominees.
- **Selection Committee:** The committee includes eminent sportspersons (Olympians or previous Major Dhyan Chand Khel Ratna or Arjuna Awardees), sports journalists, and administrators.
- **Recommendations:** The committee submits its recommendations to the Union Minister of Youth Affairs and Sports for approval.
- **Final Decision:** The **Ministry of Youth Affairs and Sports** **approves** the final list of awardees.

⇒ ***National Sports Awards** are announced by the **Ministry of Youth Affairs & Sports**. The main awards included the Major Dhyan Chand Khel Ratna Award, Arjuna Award, Dronacharya Award, Rashtriya Khel Protsahan Puraskar, Maulana Abul Kalam Azad (MAKA) Trophy, and Dhyan Chand Award.*

Air Independent Propulsion (AIP) System

- ❖ The **Ministry of Defence (MoD)** has signed a contract with **Mazagon Dock Shipbuilders Limited (MDL)** for **air-independent propulsion (AIP) plugs**. The plugs will integrate the **DRDO-developed** AIP system into the **Kalvari class submarines**.
- AIP is any **marine propulsion technology** that allows a **non-nuclear submarine** to operate **without** access to atmospheric **oxygen** (by surfacing).
- AIP enables conventional submarines to remain **submerged** for **two to three weeks** at a time.

Scorpene Class Submarines

- Scorpene class submarines are a series of **diesel-electric** attack submarines designed for various missions, including anti-surface and anti-submarine warfare, long-range strikes and intelligence gathering.

- They use diesel-electric propulsion systems, with an **additional air-independent propulsion (AIP)** system that allows them to remain submerged for longer durations.
- The Indian Navy has commissioned six Scorpene class submarines under **Project 75**, with names like INS Kalvari, INS Khanderi, INS Karanj, and INS Vela. INS Vaghsheer is set for commissioning.

Bharat Ranbhoomi Darshan

- ❖ On **Army Day (15th Jan 2025)**, the Defence Minister launched the **Bharat Ranbhoomi Darshan** website.

Key Features

- **Purpose:** To promote battlefield tourism at significant military sites across India's borders.
- **Part of Incredible India Campaign:** Ministry of Tourism integrates the site into the '**Incredible India**' initiative to highlight the nation's historical military landmarks.
- **Historical Narratives:** Detailed accounts of military actions at each site.
- **Interactive Tours:** Virtual exploration of battlefields to provide immersive experiences.
- **Visitor Guidance:** Information on applying for permits, travel logistics, and local accommodations.

Featured Battlefields

- **Galwan Valley (Ladakh):** Site of the 2020 India-China border clashes.
- **Doklam (2017):** Location of the India-China standoff, a **tri-junction** between **India, Bhutan, and China**.
- **Kargil (Dras, Ladakh):** Known for the **1999 Kargil War**.
- **Siachen Base Camp (Ladakh):** The world's highest battlefield.
- **Longewala (Rajasthan):** Notable for the 1971 India-Pakistan war.
- **Bum La and Kibithu (Arunachal Pradesh):** Key locations in the easternmost border region with China.

Benefits and Impact

- ✓ **Border Area Development:** Boost socio-economic growth by promoting tourism in remote regions.
- ✓ **Increased Connectivity:** Helps improve infrastructure and regional accessibility.
- ✓ **Educational Value:** Provides an educational experience about India's military history.

INS Sarvekshak

- ❖ **India and Mauritius** held a coordination meeting onboard the **INS Sarvekshak** to initiate the **Joint Hydrographic Survey**. It is a **hydrographic survey ship (Sarvekshan in Hindi = Survey)** under the Southern Naval Command.
- It has state-of-the-art survey equipment like the multi-beam swath echo sounding system, Side Scan Sonar, Sound Velocity Profilers, and a fully automated digital surveying and processing system.
- In addition, the ship carries a **Chetak** helicopter, which was extensively deployed during the survey.
- In 2017, Sarvekshak became the **first ship** of the Indian Navy to **deploy solar power**. It replaces the ship's emergency diesel alternator.
- It has undertaken foreign cooperation surveys in Sri Lanka, Mauritius, Seychelles, Tanzania, and Kenya.



Hydrographic Survey

- A **hydrographic survey** involves measuring & describing physical features of oceans, seas, lakes, & rivers.
- It focuses on mapping water bodies' **depth, shape, and features**, including the **seabed**.
- It provides information for **safe navigation**, helping to identify hazards like reefs, rocks, and shipwrecks.
- It supports managing and exploring **marine resources** like fisheries, oil, and gas reserves.

Blue Origin's New Glenn Rocket

- ❖ The US Federal Aviation Administration (FAA) issued a **commercial space launch license** for Blue Origin's **New Glenn** launch.
- The New Glenn rocket is a **heavy-lift launch** vehicle named after **John Glenn**, the NASA astronaut who was the **first American to circle the Earth** in 1962.
- It is designed to carry up to 45 metric tons to **Low Earth Orbit (LEO)** and 13 metric tons to **Geostationary Transfer Orbit (GTO)**. It is a **two-stage rocket** with a first stage powered by seven BE-4 engines and a second stage powered by two BE-3U engines.
- The BE-4 engines are powered by **liquefied natural gas (LNG)** and liquid oxygen, making them some of the most powerful and efficient engines ever built.
- The **first stage** is designed to be **reusable** for up to **25 flights**, which helps reduce the cost of access to space. It is also capable of landing on a **drone ship** in the sea. It can accommodate a variety of payloads & destinations, offering flexibility for different types of missions.
- The rocket will support **Amazon's Project Kuiper**, which aims to deliver high-speed, low-latency **broadband service** globally.

⇒ *Blue Origin was founded in 2000 by **Jeff Bezos**, the **founder of Amazon**. Its motto is to make space travel more accessible and affordable for everyone.*

Galaxy-sized Gravitational Waves Detector

- ❖ Scientists confirmed that the universe's fabric constantly vibrates due to gravitational waves from supermassive black hole collisions using a **galaxy-sized detector**.

⇒ **Gravitational Waves:** First detected in 2015 using earth-based detectors like LIGO, these are ripples in space-time caused by massive objects like black holes orbiting, colliding or mergers at galactic centres.

Detectors Used

- **Detector Type: Pulsar Timing Arrays (PTAs)** use rapidly spinning neutron stars (pulsars) as detectors.

⇒ **Pulsars:** Neutron stars emitting radiation pulses, used for detecting gravitational waves.

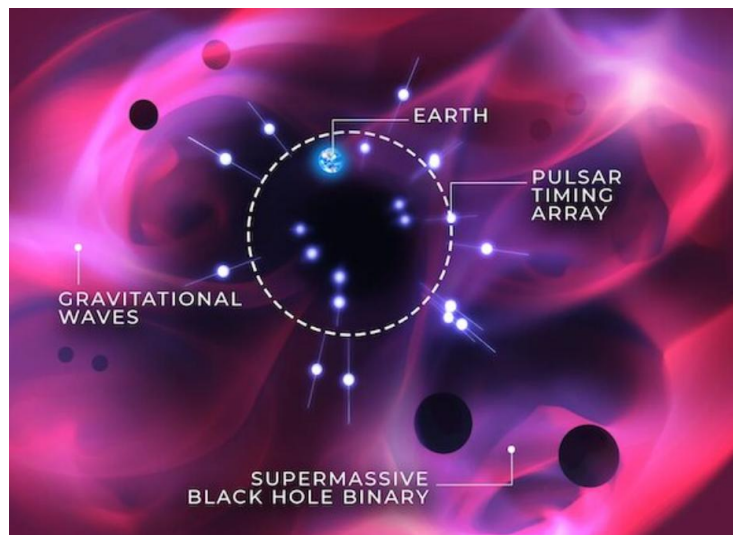
- **MeerKAT** is the **largest PTA**, observing 83 pulsars using **South Africa's MeerKAT** radio telescope, which measures timing variations in pulsar signals caused by spacetime distortions from gravitational waves.
- **International Pulsar Timing Array (IPTA)** is a collaborative effort combining global PTA data for enhanced precision.

Findings

- **Gravitational Wave Background (GWB):** A cosmic "ocean" of waves from all galactic mergers in history.
- **Unexpected Intensity:** GWB is **louder than predicted**, meaning more supermassive black hole mergers.
- **Hot Spot Discovery:** Anomalous gravitational wave activity identified in the **Southern Hemisphere** sky.

Implications of the Findings

- ✓ Enabled precise mapping of cosmic architecture from gravitational wave signals.
- ✓ **Potential Origins of GWB:** Likely caused by black hole interactions but could include early universe events or exotic phenomena.



Paraquat Poisoning

- It is known as **paraquat dichloride** or **methyl viologen**, it is a widely used **herbicide** for weed control and crop desiccation.
- The World Health Organization (WHO) classifies paraquat as **moderately hazardous**.
- It is banned in over 70 countries, including China and the EU, but still widely used in the US and India.
- Even a small accidental sip can be fatal.

How Does it Harm?

- Poisoning can occur through **ingestion, prolonged skin contact, or inhalation**.
- The chemical rapidly spreads through the body and causes damage to the mouth, stomach, intestinal lining, lungs, liver, kidneys, heart (causing rapid heart rate and potential failure) and Respiratory system.
- Treatment focuses on **supportive care** to manage organ damage as there is **no known antidote** for paraquat poisoning.

Regulation in India

- The chemical's use is governed by the **Central Insecticides Board and Registration Committee** under the **Insecticides Act, 1968** and is restricted to specific crops including:
 - ❖ **Food crops:** wheat, rice, potato, grapes, maize
 - ❖ **Commercial crops:** tea, coffee, rubber, apple
 - ❖ Waterway management for controlling specific weeds

⇒ *In the **USA** it is restricted to licensed commercial users.*

Central Insecticides Board and Registration Committee (CIBRC)

- CIBRC is under the **Ministry of Agriculture & Farmer's Welfare**.
- It is responsible for advising the Central & State governments on technical matters related to insecticides.