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Time: 45 Min

Date: 21-01-2026

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EX-CAPF OFFICIALS CONCERNS OVER IPS APPOINTMENTS IN CAPFS

Context

- Retired Central Armed Police Force (CAPF) officers have moved the Supreme Court with a contempt petition alleging failure to implement the Court's 2025 order directing a progressive reduction of IPS deputation in CAPF.

Background

- In the case of **Sanjay Prakash & Others vs Union of India, 2025**, the Supreme Court ruled that:
  - **Group A officers of CAPFs** are to be treated as **"Organised Services"** for all purposes.
  - The deputation of IPS officers to Senior Administrative Grade (SAG) posts i.e., up to the rank of Inspector General (IG), in CAPFs should be progressively reduced within an outer limit of two years.
- Presently, **20% posts** in the rank of Deputy Inspector-General (DIG) and **50% posts** in the rank of Inspector-General (IG) in the CAPFs are reserved for IPS officers.
- **Purpose of the Ruling:** The decision aimed to ensure fair career progression for CAPF cadre officers and to curb the longstanding dominance of deputed IPS officers within CAPFs.

Role of the Ministry of Home Affairs

- The Ministry of Home Affairs (MHA) serves as the **administrative authority** for both the Indian Police Service (IPS) and the Central Armed Police Forces (CAPFs).
- The MHA has traditionally justified the deputation of IPS officers on grounds such as;
  - Bringing in policing experience from state cadres to strengthen central forces.
  - Maintaining a uniform standard of leadership across all forces.
- Despite the Supreme Court's directive, at least **eight IPS officers have been appointed** to senior positions in the CAPFs since the May 2025 ruling.
  - These include appointments to posts such as Commandant and Inspector General.

Concerns of IPS appointments in CAPFs

- **Stagnation in Career Progression:** Due to high reservation of senior ranks (e.g., 50% IG posts) for IPS officers, **CAPF cadre officers face limited promotional opportunities.**
  - On average, a CAPF officer takes 25 years to reach the rank of Commandant, a position they should ideally achieve in 13 years.

- **Violation of Organisational Integrity:** The continued deputation of IPS officers hampers institutional autonomy and the long-term professionalization of CAPFs as elite forces.
- **Violation of Natural Justice and Equality: Articles 14** (Right to Equality) and **Articles 16** (Equality of Opportunity in Public Employment) come into play, as CAPF cadre officers are denied equal promotional avenues compared to their IPS counterparts.

Policy Recommendations

- **Implementation of the SC Order:** MHA must create a transition plan to phase out IPS deputations in SAG and higher posts over the next two years as directed.
- **Conduct cadre reviews across all CAPFs** and amend Recruitment Rules (RRs) to ensure promotions are based on merit and experience within the CAPFs.
- **Parliamentary Oversight:** Establish a Parliamentary Standing Committee review to examine deputation practices and career stagnation in CAPFs.
- **Transparent Deputation Policy:** Develop a uniform and transparent policy on inter-cadre deputations, clearly laying down eligibility, tenure, and objective criteria.

Central Armed Police Forces (CAPF)

- The Central Armed Police Forces (CAPF) is the collective name of **central police organizations** under the **Ministry of Home Affairs** of India.
- These forces are responsible for internal security and guarding the borders. CAPF is classified as;
  - **Assam Rifles (AR):** It is a central police and paramilitary organization responsible for border security, counter-insurgency, and law and order in Northeast India.
  - **Border Security Force (BSF):** It is primarily deployed along the Pakistan and Bangladesh borders, since 2009 it is also posted in Left Wing Extremism (LWE) affected areas.
  - **Indo-Tibetan Border Police (ITBP):** It is deployed for guarding duties on the Indo-China border.
  - **Sashastra Seema Bal (SSB):** It guards the Indo-Nepal and Indo-Bhutan borders.

- ◆ **National Security Guard (NSG):** It is a counter-terrorism unit under the Ministry of Home Affairs. All personnel are deputed from other CAPFs and the Indian Army.
- ◆ **Central Reserve Police Force (CRPF):** It is deployed for internal security duties and has a large presence in North East, LWE theater and Jammu and Kashmir.
- ◆ **Central Industrial Security Force (CISF):** It provides security to various Public Sector Undertakings (PSUs) and other critical infrastructure installations, major airports across the country and provides security during elections and other internal security duties and VVIP protection.

Source: TH

NEW LANCET REPORT SETS CITIZEN-CENTRED HEALTHCARE GUIDELINES FOR INDIA

Context

- The Lancet Commission's new report charts a rights-based, citizen-centred roadmap for **Universal Health Coverage in India,** aligning with Viksit Bharat 2047.

About

- **The reforms described in the report** promote community participation, transparency and equity -- key principles of Universal Health Coverage (UHC) -- aimed at ensuring high-quality, affordable care for all.
- It emphasizes the **urgent need to strengthen India's public healthcare** by integrating services across primary, secondary, and tertiary levels.

Guiding Principles of the Commission

- A transition from a facility-centric, reactive, and fragmented delivery system focused on specific diseases towards a **comprehensive, coordinated, citizen-centred health system.**
- A transition from **citizens being passive recipients** of services to becoming **active agents** with rights who are engaged in the health system.
- A transition from **providing weight to only professional qualifications** to emphasising **provider competencies, values, and motivations**, and empowering **frontline workers and practitioners of Indian systems** of medicine (eg, Ayurveda, Yoga, Unani, Siddha, and Homeopathy).

- To responsibly and ethically leverage the **power of innovative technology** to support the reimagined health system and deliver citizen-centred care.
- To **explicitly acknowledge rights and health equity** as a core value of universal health coverage and the reduction of inequities as a measure of progress across universal health coverage goals.

What is Universal Health Coverage?

- It means that all people have **access to the full range of quality health services** without financial hardship.
- **Key components of UHC include:**
  - ◆ **Access to Care:** Everyone should be able to obtain necessary health services when they need them.
  - ◆ **Quality Services:** The care provided should be effective, safe, and of good quality.
  - ◆ **Financial Protection:** Individuals should not face financial difficulties due to medical expenses.
- **UHC** is rooted in the **universal human right to health,** affirmed in **international covenants and the Alma-Ata Declaration (1978)**, which prioritised comprehensive primary healthcare.

Need For Universal Health Coverage in Indian Context

- **Historical Commitment to Universal Healthcare: Bhore Committee (1943–46)** reflected a clear preference for universal healthcare over insurance-based UHC.
- **Policy Evolution after Independence: India's National Health Policy of 1983** recognized the goal of **"Health for All"** and emphasized the importance of primary healthcare and equitable distribution of healthcare resources.
- **Shift towards Insurance-led UHC: Welfare Schemes like Rashtriya Swasthya Bima Yojana (RSBY) 2008 and Ayushman Bharat–PMJAY** institutionalised UHC but reinforced an insurance-heavy approach.
- **Weak Public Health System and Rising Private Dependence:** Chronic underfinancing of primary healthcare has led to poor quality public provisioning, shortage of infrastructure and workforce.
  - ◆ National Sample Survey (NSS) data show growing reliance of the poor on private healthcare, rising out-of-pocket expenditure (OOPE) & increased household indebtedness.

- **Post-Covid Realisation:** The Covid-19 pandemic exposed inequities in insurance-based access, exclusion of informal workers and migrants & fragility of hospital-centric models.
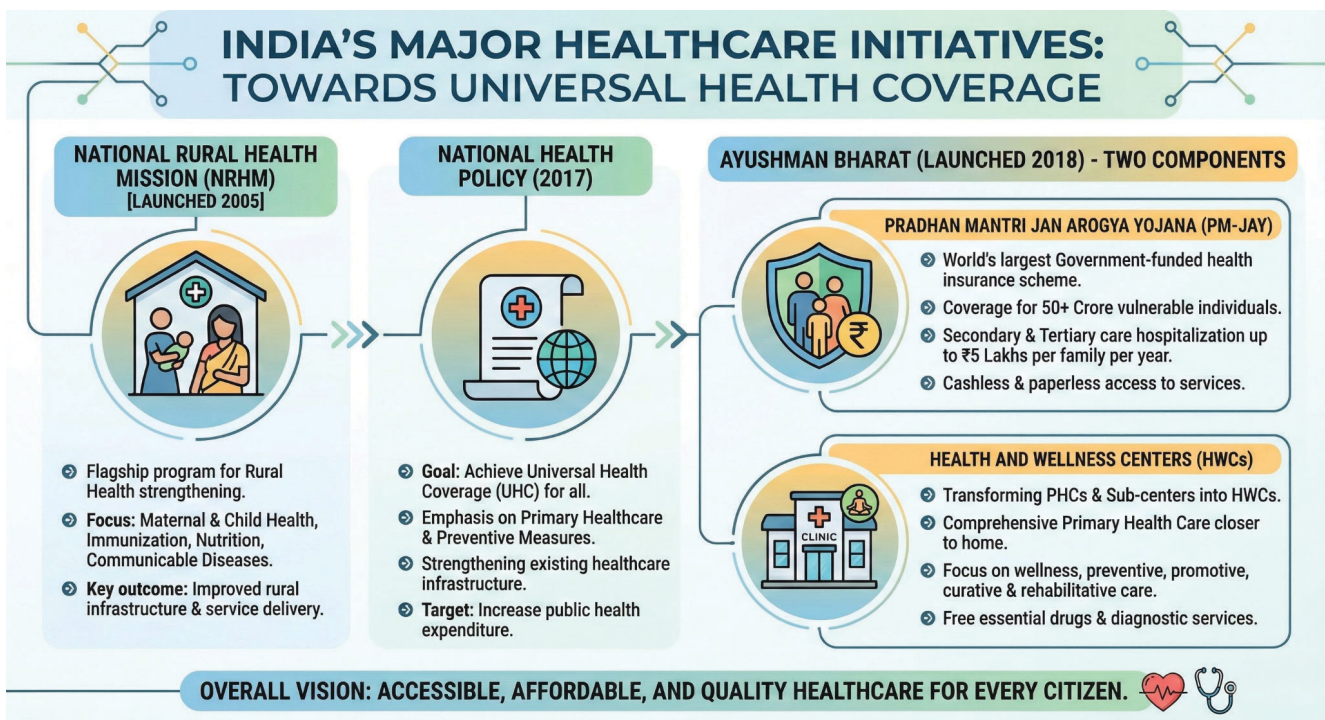
Constitutional Basis for UHC:

- The **Directive Principles of State Policy** in Part IV of the Constitution provides a basis for the right to health.

- **Article 39 (e)** directs the state to secure the health of workers; **Article 42** emphasises just and humane conditions of work and maternity relief; and **Article 47** casts a duty on the state to raise the nutrition levels and standard of living, and to improve public health.

- The Constitution also endows the panchayats and municipalities to strengthen public health under **Article 243G**.

Challenges in Adopting UHC in India

- **Resource Constraints:** India faces significant funding limitations in healthcare, with a low public health expenditure compared to many other countries. This affects the ability to provide comprehensive services.

  - Low public health expenditure (~2.1% of GDP), below the NHP target of 2.5%.

- **Infrastructure Gaps:** Many areas, especially rural regions, lack adequate healthcare infrastructure, including hospitals, clinics, and trained personnel, making access to care difficult.

- **Healthcare Workforce Shortages:** There is a shortage of healthcare professionals, particularly in rural areas, leading to disparities in access and quality of care.

- **Fragmented Health Systems:** India's healthcare system is a mix of public and private providers, leading to inconsistencies in quality and accessibility.

  - And, **Health is a State subject**, while financing and flagship schemes are centrally driven, leading to uneven outcomes.

Source: HT

THE EV BOOM IS ACCELERATING A COPPER CRUNCH

Context

- The global shift toward **electric vehicles (EVs)** is leading to a growing challenge of **copper crunch.**

About

- **Copper** forms the **backbone** of EV batteries, motors, wiring, charging infrastructure, and power grids.

- **As EV adoption accelerates,** copper demand has entered a phase of **exponential growth** that many policymakers and markets have underestimated.

Copper (Cu)

- **Copper (Cu)** is a **reddish-orange, soft** and **highly malleable metal** with **atomic number 29,** known for its exceptional electrical and thermal conductivity.

- These properties make it vital for **electrical wiring, power transmission, plumbing and electronic applications.**

- Copper is also a key component of important alloys such as **brass (copper–zinc) and bronze (copper–tin),** which enhance strength and corrosion resistance.

- **Chile, Peru and Australia** accounted for 19%, 12%, and 10% of the world's copper reserves in **2024.**

- India has significant **copper ore resources** primarily in **Rajasthan's Khetri belt, Madhya Pradesh's Malanjkhand** , and **Jharkhand's Singhbhum belt.**

Expansion of EV

- **Between 2015 and 2025,** global EV sales rose from approximately **0.55 million units to an estimated 20 million units.**

   - The **associated copper consumption** surged from roughly **27.5 thousand tonnes to over 1.28 million tons,** showing copper to be the hidden backbone of the EV revolution.

- Therefore, the EV transition must be understood not only as a technological shift but also as a **resource-intensive transformation constrained by metals as much as by markets.**

Concerns with Rising Demand of Cooper

- **Deficit:** Copper demand is rising sharply, global supply has begun to plateau, creating a widening gap.

- **Concerns Faced by Major Producers:** Declining ore grades at existing mines, decade-long development timelines for new projects, and environmental opposition in major producing regions such as Chile, Peru and the United States constrain supply growth.

- **Future Projection:** The gap is expected to widen to 4.5 million tons by 2028 and nearly 8 million tons by 2030, equivalent to the output of the world's 10 largest copper mines combined.

- **Impact on EV:** Such shortages could increase EV costs, delay the development of charging infrastructure, and strain decarbonisation targets.

- **China's Dominance:** China accounts for almost 60% of global EV copper demand.

- China controls over 70% of global battery cell production and its deeply integrated supply chain.

- This asymmetry provides China with a structural advantage in terms of pricing power, long-term supply contracts, and strategic leverage over copper-rich regions.

Way Ahead

- India is currently not self-sufficient in terms of its copper supply.

   - Domestic ore production in 2023-24 was 3.78 million tonnes, 8 percent lower than in 2018-19.

- Copper is a deep-seated mineral, which makes it more difficult and expensive to explore and mine as compared to surficial or bulk minerals.

- India must, therefore, develop a strategy to build a resilient copper supply chain that meets its growing needs by optimising various stages of the supply chain.

Source: TH

THE IMPORTANCE OF 'PAX SILICA' FOR INDIA

Context

- Recently, the United States convened the **inaugural Pax Silica Summit**, emphasizing reducing coercive dependencies, securing the flow of critical minerals, and promoting trusted digital ecosystems.

About 'Pax Silica'

- The term *'Pax Silica'* derived from Latin 'Pax' **(peace)** and 'Silica' **(a core compound in semiconductors).**

- It symbolizes the pursuit of **technological peace and prosperity** through **resilient, transparent, and cooperative supply chains.**

Need for 'Pax Silica'

- **Supply Chain Security:** To ensure reliable and diversified access to **Rare Earth Elements (REEs)** and critical minerals essential for semiconductors and AI technologies.

- **Reducing Dependence on China:** To counter **China's dominance** and coercive control over global REE supply chains and technology exports.

- **Resilient Technology Ecosystem:** To build **resilient, transparent, and trusted global supply chains** for frontier technologies like AI and semiconductors.

- **Economic Stability and Strategic Balance:** To safeguard the **global economy from disruptions** caused by monopolized production or geopolitical tensions.

- **Allied Technological Collaboration:** To bring together **technological powerhouses** (US, Japan, South Korea, Netherlands, Israel) and **resource-rich nations** (Australia, UAE, Qatar) for joint innovation.

- **Building Trusted Digital Infrastructure:** To establish **ethical AI frameworks**, cybersecurity standards, and **secure semiconductor ecosystems** among like-minded nations.

- **Encouraging Sustainable Mining and Innovation:** To promote **responsible extraction**, recycling, and **green manufacturing** of critical minerals.

- **Maintaining U.S. Technological Leadership:** To reaffirm the **US's leadership** in global innovation governance and ensure **technological primacy** in the emerging AI–semiconductor era.

Composition of Pax Silica

- **United States and Japan:** Innovation and R&D giants in semiconductors and AI.

- **Australia:** Leading exporter of lithium and a key player in REE mining.

- **Netherlands:** Home to ASML, a global leader in advanced lithography systems.

- **South Korea:** Dominant in memory chip manufacturing.

- **Singapore:** Longstanding chip manufacturing base linked with U.S. firms.

- **Israel:** Specializing in AI software, cybersecurity, and defense technologies.

- **United Kingdom:** The world's third-largest AI market with a vibrant innovation ecosystem.

- **Qatar and UAE:** Financial powerhouses investing heavily in AI and advanced technologies.

- **Observers** at the inaugural summit included **Canada, the European Union, OECD, and Taiwan**, all of whom may become members as the initiative evolves.

India's Prospective Role in Pax Silica

- **Expanding Digital Infrastructure:** India's **fast-growing digital economy and AI adoption** align with Pax Silica's goals.

- **Semiconductor Ambitions:** Through **India's Semiconductor and AI Missions**, the country is investing heavily in chip design and fabrication.

- **Strategic Partnerships:** Collaboration with **Japan, Israel, Singapore, and the U.S.** in chip manufacturing and R&D.

- **Human Capital Advantage:** India's **large pool of STEM graduates** and returning AI engineers bolster its capacity to contribute to global innovation.

- **Resilient Supply Chains:** India's experience with the **Quad Critical Minerals Initiative** makes it a natural partner for Pax Silica's objectives.

Benefits For India

- **Access to Advanced Technology:** Greater opportunities for technology transfer and joint R&D.

- **Investment and Industrial Growth:** Attraction of global investments in AI and semiconductor sectors.

- **Enhanced Global Standing:** A role in shaping global tech governance alongside major economies.

- **Supply Chain Security:** Reduced vulnerability to **REE export disruptions** from China.

- **Integration into Global Value Chains:** Entry into advanced **semiconductor and AI production networks**.

Challenges For India

- **Strategic Autonomy:** Balancing its **non-aligned foreign policy** with participation in a **US-led bloc**.

- **Economic Gap:** India's **developing tech ecosystem** lags behind established Pax Silica members.

- **Policy Divergences:** India's **subsidy- and protection-based industrial policy** may conflict with the market-driven approaches of high-income members.

- **Expectation Gap:** As the first **developing and non-U.S. ally member**, India must manage differing expectations within the group.

Strategic Implications

- **Dual Supply Chain Order:** The world may evolve into **two REE and technology ecosystems**, one led by **China**, the other by **Pax Silica**.

- **India's Alignment Choice:** India is likely to align with **Pax Silica's democratic and transparent framework**, while maintaining **strategic flexibility**.

- **Regional Stability:** Pax Silica may foster **technological cooperation** and **economic peace** across the Indo-Pacific.

Source: TH

UGC'S CIRCULAR MANDATING THE TEACHING OF A THIRD LANGUAGE IN HIGHER EDUCATION

In News

- The Tamil Nadu government strongly opposed the UGC's circular mandating the teaching of a third language in higher education.

Background

- The National Education Policy (NEP) 2020 retains the three-language formula introduced in 1968 but offers more flexibility.

- Unlike the earlier policy, it does not make Hindi compulsory. Children will learn three languages chosen by the State, region, and themselves, with at least two being Indian languages.

- The policy emphasizes bilingual instruction in the mother tongue/home language and English, and highlights Sanskrit as an optional language choice.

Objectives

- It aims to encourage students to learn beyond English and their mother tongue, fostering linguistic diversity.

- The UGC aims to bridge cultural and regional divides by introducing a third language. Multilingual skills are seen as an asset in globalized workplaces.

- The NEP advocates for a three-language formula to nurture cognitive flexibility and cultural awareness.

Issues and Challenges

- States like Tamil Nadu, which follow a two-language policy, view the circular as an attempt to impose Hindi, sparking political and cultural resistance.

- Many universities lack qualified faculty and infrastructure to introduce additional language courses.

- Adding a third language may increase academic load, especially in professional courses.

- Students from marginalized backgrounds may struggle with access to quality language instruction.

- Critics argue that mandating language learning infringes on the academic autonomy of states and institutions.

Conclusion and Way Forward

- The UGC's circular aims to create a multilingual, culturally integrated higher education system, but its success depends on flexible implementation,

respect for regional language policies, and adequate resources.

- A balanced, adaptable approach is essential to avoid deepening linguistic divides and to achieve the NEP's vision of inclusive, holistic education.

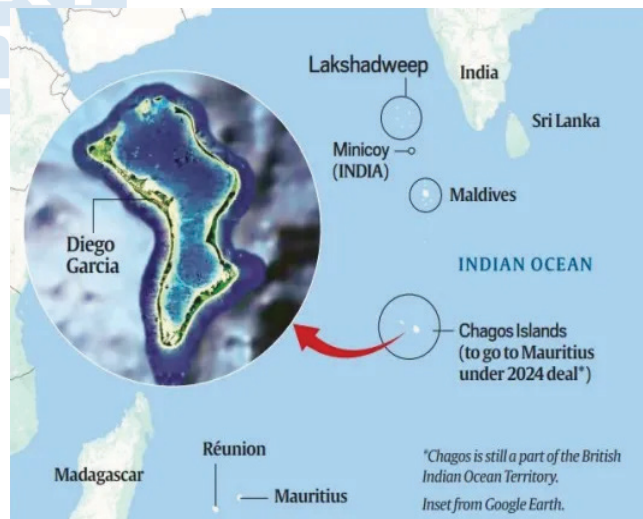Source :TH

═══ NEWS IN SHORT ═══

CHAGOS ISLANDS

In News

- The UK government defended its deal to transfer the **Chagos Islands to Mauritius** while retaining a lease for a strategic military base, amid criticism from US President Donald Trump.

  ◆ In 2025 The United Kingdom signed an agreement handing sovereignty over the contested and strategically located Chagos Islands to Mauritius.

About Chagos Archipelago

- It comprises more than 60 low-lying islands in the Indian Ocean roughly 1,600 km to the northeast of the main island of Mauritius.

- It was separated from **Mauritius in 1965,** when Mauritius was still a British colony.

- Britain purchased the islands for three million pounds but Mauritius has argued that it was illegally forced to give them away as part of a deal to gain independence from Britain.

- In the late 1960s, Britain invited the US to build a military base on Diego Garcia, the largest of the Chagos Islands, removing thousands of people from their homes.

- Since the 1980s, Mauritius has claimed sovereignty over the Chagos Islands.

- In 2019, the UN's International Court of Justice ruled that Mauritius' decolonisation was incomplete at independence in 1968 and advised that the UK must end its administration of the islands as soon as possible.

Source :IE

ARTICLE 15(5)

Context

- The opposition has urged the Union government to ensure the implementation of Article 15(5) of the Constitution while framing a single higher education regulator under the proposed **Viksit Bharat Shiksha Adhishthan Bill, 2025**.

What is Article 15(5)?

- Article 15(5) empowers the State to make special provisions for the advancement of Scheduled Castes (SCs), Scheduled Tribes (STs), and Other Backward Classes (OBCs).
- It enables the **State to provide reservations in admissions, including in private educational institutions,** whether aided or unaided.
- Minority educational institutions under **Article 30(1)** are exempted from its ambit.
- The provision was introduced through the **93rd Constitutional Amendment Act, 2005.**

Significance of Article 15(5)

- It led to the introduction of **27% OBC reservation** in Centrally-funded Higher Educational Institutions (CFHEIs) such as IITs, IIMs, NITs, and Central Universities.
- It contributed to **intergenerational mobility, skill acquisition, and representation in professional education.**
- It reflects the constitutional vision of **substantive equality**, moving beyond formal equality.

Judicial Validation

- The constitutional validity of **Article 15(5)** was upheld by the Supreme Court in **Pramati Educational and Cultural Trust vs Union of India (2014).**
- The Court affirmed that the State can mandate reservations in **non-minority private educational institutions.**

Source: TH

STATEHOOD DAY OF MANIPUR, MEGHALAYA AND TRIPURA

Context

- The President of India has extended greetings to the people of Meghalaya, Tripura and Manipur on their Statehood Day.

- Manipur, Meghalaya and Tripura were granted statehood on January 21, 1972, following the enactment of the **North-Eastern Areas (Reorganisation) Act, 1971.**

About

- **Manipur:** Formerly a princely state, it merged with India in **1949.** It functioned as a Union Territory from **1956** until it was granted statehood.
- **Tripura:** Also a princely state, it joined the Indian Union in **1949.** Like Manipur, it was a **Union Territory from 1956** before becoming a full state in 1972.
- **Meghalaya:** Originally part of Assam, it was first made an **autonomous state within Assam** in 1970 before being carved out as a separate state in 1972 to recognize its unique tribal and cultural identity.

Source: AIR

ONE STATION ONE PRODUCT (OSOP)

In News

- Indian Railways' **One Station One Product (OSOP) scheme** has expanded to over 2,000 Railway Stations, empowering 1.32 Lakh Artisans.

About

- The **One Station One Product (OSOP) scheme** was **launched in 2022** as an innovative initiative to promote local, indigenous, and specialised products by leveraging India's vast railway network.
- The **Ministry of Railways** has designed the OSOP stalls to be aesthetically uniform yet locally distinct.
- These stalls are often designed by the **National Institute of Design (NID)** to ensure they are functional and attractive to travelers.
- The OSOP scheme is a key component of the **PM Gati Shakti National Master Plan**, which aims to provide seamless multi-modal connectivity and improve the logistics of local goods.

Source: PIB

EU'S ANTI-COERCION INSTRUMENT

Context

- The French President mentioned activating the **EU's anti-coercion instrument,** after US President's tariffs threats regarding Greenland.

European Union's Anti-coercion instrument

- It is a **trade tool** that the bloc adopted in **2023** but has never used.
- **Aim:** To respond to any country using trade weapons to pressure an EU member state.

- **Measures:**
  - The armoury allows the EU to take measures such as import and export restrictions on goods and services in its single market.
  - It also limits American companies' access to public procurement contracts in Europe.
- **Establishment:** The instrument's creation came after Lithuania accused China of banning its exports because it allowed a Taiwanese diplomatic representation to be opened in 2021.
- **Implementation Process:** Both the commission and member states have the right to seek its activation.
  - It would need the approval of at least 55% of the member countries voting in favour, representing 65% of the bloc's population.

Source: TH

CENTRE LIKELY TO AMEND SARFAESI ACT

Context

- The Union government is considering amendments to the SARFAESI Act, 2002 to remove legal ambiguities and strengthen regulatory oversight.

About

- The proposed changes aim to **improve credit enforcement** and promote ease of doing business.
- A key focus is enhancing control over the **Central Registry of Securitisation Asset Reconstruction and Security Interest of India (CERSAI).**
  - **CERSAI is a central online registry** that records security interests (mortgages/charges) over immovable, movable, and intangible assets, helping prevent fraudulent multiple lending on the same asset and increasing transparency.

What is the SARFAESI Act, 2002?

- **The Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest (SARFAESI) Act** provides a legal mechanism for banks and financial institutions to recover non-performing assets.
  - It allows lenders to enforce security interests without court or tribunal intervention.
- The Act applies when the outstanding loan amount exceeds ₹1 lakh.
- Recovery can be carried out by **taking possession of secured assets** of borrowers or guarantors.

Source: BS

STEEL SLAG TECHNOLOGY

In News

- Union Minister of State (Independent Charge) for Science and Technology Dr Jitendra Singh advocated wider adoption of **steel slag–based road construction** and repair technology, particularly in hilly and Himalayan regions.

More About the News

- The **Ministry's Technology Development Board (TDB)** signed an agreement with Ramuka Global Eco Work Pvt. Ltd., Visakhapatnam.
- The agreement allows commercial **rollout of ECOFIX**, a pothole repair mix developed by CSIR–Central Road Research Institute (CRRI).
- ECOFIX uses **processed iron and steel slag, a byproduct of steel manufacturing, as a construction material.**

What is Steel Slag Technology?

- Steel slag is a byproduct created during the melting of **iron ore at very high temperatures.**
- Traditionally considered industrial waste, it is now processed to replace natural aggregates (like crushed stone) in road construction.

Source: DD

REUSABLE LAUNCH VEHICLES

Context

- The global space sector is witnessing a paradigm shift from expendable launch systems to reusable architectures.

What Is a Reusable Launch Vehicle (RLV)?

- A Reusable Launch Vehicle is a **space launch system designed to return to Earth** after completing its mission and be used for multiple launches.
  - Unlike traditional expendable rockets, RLVs aim to recover and reuse major components, such as boosters or entire vehicles.
- RLVs may take different forms, including:
  - **Winged space planes** that land horizontally on runways.
  - **Vertically landing boosters** that return using retro-propulsion.
  - **Fully reusable systems** where both stages are recovered and reflown.
- **SpaceX** has successfully recovered the first stages of its **Falcon 9** rockets more than 520 times.

Key Technologies Enabling RLVs

- **Advanced propulsion systems** capable of multiple restarts and controlled descent.

- **Thermal Protection Systems (TPS)** to withstand extreme heat during atmospheric re-entry.
- **Autonomous guidance, navigation, and control** for precision landing.
- **Lightweight composite materials** that endure repeated thermal and mechanical stress.

India's Reusable Launch Vehicle Programme

- The Indian Space Research Organisation (ISRO) is developing a **winged Reusable Launch Vehicle** resembling a spaceplane.
- ISRO successfully conducted the **RLV-LEX autonomous landing experiment,** marking a major milestone in reusable spaceflight technology.

Source: TH

DARWIN'S BARK SPIDER

In News

- A recent study found that the **toughest biological silk** (dragline silk) produced by large adult females is **Darwin's bark spider.**

Darwin's bark spider (Caerostris darwini)

- It is found in the **forests of Madagascar.**
- It produces the toughest **biological silk known**, with strength surpassing steel with a tensile strength of about 1.6 gigapascals.
- However, this **extreme strength is not universal**, as silk quality is closely linked to body size, with larger spiders evolving to produce tougher silk to support bigger webs and capture larger or faster prey.
- They have **relatively short lifespans**, typical of orb-weaving spiders, with females living longer than males.

Source :TH

SACRED GROVES

Context

- A new study found that the **Sacred groves in the northern Western Ghats** show the highest levels of **human disturbance.**

About

- **Long protected by socio-cultural norms,** sacred groves are now increasingly threatened by urbanisation and the weakening of traditional practices.
  - Historically, sacred groves were protected through local taboos and nature worship.
  - **The decline of these traditional practices** has made many such areas more vulnerable to human intervention.

- The study notes that **significant loss of sacred groves** in the **northern Western Ghats** has been reported over the **past five decades.**

What are Sacred Groves?

- Sacred groves are patches of trees or forest areas that are **traditionally protected by local communities** for their religious, cultural, and ecological significance.
- **They are known by diverse names:** Devarakadu in Karnataka, Kavu in Kerala, Sarna in Madhya Pradesh, Oran in Rajasthan, Devrai in Maharashtra, Umanglai in Manipur, Law Kyntang/ Law Lyngdoh in Meghalaya, Devan/Deobhumi in Uttarakhand etc.
- **Sacred groves preserve** biodiversity, regulate climate, conserve water, support livelihoods, protect cultural heritage, and promote environmental awareness.

Source: DTE

ANTARCTIC PENGUINS

In News

- A decade-long study in Antarctica has found that penguins are shifting their breeding seasons earlier, likely due to climate change.

Penguins

- Penguins are **flightless birds** that are highly adapted for the marine environment. They are excellent swimmers and can dive to great depths.
- They play a key role in Antarctic food chains, including bringing nutrients from deep water up to the surface, which is vital to algae being able to complete their photosynthesis.
- They live primarily in the Southern Hemisphere.
- **Major species and IUCN Red List status**
  - Emperor Penguin(Aptenodytes forsteri) is listed as Near Threatened
  - Royal Penguin(Eudyptes schlegeli)is listed as Least Concern
  - Adelie Penguin(Pygoscelis adeliae) listed as Least Concern
  - Humboldt Penguin(Spheniscus humboldti) is listed as Vulnerable
  - Magellanic Penguin(Spheniscus magellanicus) is listed as Least Concern
  - Fiordland Penguin(Eudyptes pachyrhynchus) is listed as Near Threatened
  - Gentoo Penguin(Pygoscelis papua)is listed as Least Concern.

Source :IE