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GS 1: ART & CULTURE, HISTORY, INDIAN SOCIETY AND GEOGRAPHY

1. Further south

Context: The Iron Age in India has been a subject of fascination and discussion. In the rest of the world, the Iron Age succeeded the Copper-Bronze Age or bridged the gap between the Bronze Age and the Early Historic period. But the situation in India is different: when the region north of the Vindhyas belonged to the pre-iron Chalcolithic or Copper Age, the south, with over 3,000 sites, was associated with iron. Tamil Nadu Chief Minister M.K. Stalin's recent statement, that the origin of iron in the State could be traced to the first quarter of the fourth millennium BCE, is significant as this pushes the antiquity of iron further.

Key points

- **Overview:** Recent dating of burial urn samples from Sivagalai in Tamil Nadu's Tuticorin district suggests that the Iron Age may have begun there at least 1,000 years earlier than previously estimated.
- **Features of Megalithic Culture of South India:** *Arrangement of the burials* - The manner of disposing of the dead in the region of the Megalithic Cultures exhibits numerous variations. Each type of burial system has a unique arrangement of megaliths on the ground to mark the grave.
  Black and Red Pottery - Black-and-red ware was the main pottery tradition of the Deccan Iron Age sites. The pottery types include carinated vessels, bowls with pedestals, and spouted dishes. A conical-shaped lid is often provided with a loop on the top.
- **Types of megaliths in the South:** *Large urns* - Urns with bones collected from previously excarnated dead bodies in them. These urns are stored with other burial equipment in a pit. After the pit has been covered, it can be located using a circular stone demarcation.
  Cists - Cists are constructed from stone slabs and occasionally have a similar flat stone placed on top of them. These are sometimes equipped with portholes curved out on one of the chamber wall slabs.
  Legged urn - Another significant design element of these Megaliths is the legged urn or sarcophagi, which were used to encase the body before actual burial.
  Chamber burial - The body has occasionally been placed inside chambers that have been cut out of the compact lateritic floor.
- **Iron Age:** The Iron Age refers to the period in history when iron became the dominant material for tools and weapons, replacing earlier materials like stone and bronze. It is marked by significant advancements in metallurgy and technology, leading to societal and economic transformations.
- **Key Locations in India:** *Sivagalai (Tamil Nadu)* - Earliest evidence, dated to 3,345 BCE.
  Mayiladumparai (Tamil Nadu) - Evidence from 2,172 BCE.
  Brahmagiri (Karnataka) - Iron Age evidence from 2,140 BCE.
  Gachibowli (Telangana) - Dated to 2,200 BCE.
- **Phases of the Iron Age in India:** *Early Iron Age (1500 BCE – 1000 BCE)* - Introduction of iron tools in agriculture and hunting (e.g., Hallur, Karnataka). Overlaps with the late Vedic period; texts like the Atharvaveda composed.
  Middle Iron Age (1000 BCE – 600 BCE) - Expansion of iron technology and urbanization. Painted Grey Ware (PGW) culture emerges in the Ganga-Yamuna plains. Rise of fortified settlements like Kausambi and early states (Janapadas).
  Late Iron Age (600 BCE – 200 BCE) - Formation of Mahajanapadas and rise of the Mauryan Empire. Spread of Buddhism and Jainism; Ashoka's edicts promote ethical governance.
- **Key Features of the Iron Age:** *Iron Technology* - Advanced smelting techniques led to the production of durable tools and weapons.
  Agricultural Revolution - Iron ploughs and sickles boosted productivity, enabling surplus food production.
  Urbanization - Fortified cities with sophisticated infrastructure, including drainage systems and public buildings.
  Political Structures - Emergence of Janapadas and Mahajanapadas, followed by the Mauryan Empire's rise.
  Cultural Growth - Composition of texts like the Upanishads and emergence of Buddhist and Jain art and philosophy.

GS 2: POLITY, GOVERNANCE, SOCIAL JUSTICE, INTERNATIONAL RELATIONS/INSTITUTIONS

2. Odisha tops NITI fiscal health index, Chhattisgarh next best

Context: Mineral-rich Odisha, Chhattisgarh, Goa, and Jharkhand have emerged as top-performing 'achievers' among the States listed in NITI Aayog's first Fiscal Health Index (FHI) report released on Friday. The report titled "Fiscal Health Index 2025" ranked States for 2022-23, covering 18 major States that drive the Indian economy in terms of their contribution to India's GDP, demography, total public expenditure, revenues, and overall fiscal stability. The metrics from the report offer a comprehensive view of fiscal health, aiding policymakers in identifying areas for improvement and fostering best practices across states.

Key points

- **Overview:** The Chairman of the 16th Finance Commission, Dr. Arvind Panagariya, launched the inaugural issue of NITI Aayog's report titled "Fiscal Health Index (FHI) 2025".
- **Fiscal Health Index:** This initiative highlights critical aspects of state finances, emphasizing the importance of transparency, revenue mobilization, and sustainable public financial management. The FHI assesses states using five sub-indices-
  - Quality of Expenditure.
  - Revenue Mobilization.
  - Fiscal Prudence.
  - Debt Index.
  - Debt Sustainability.
- **Top Performers:** *Odisha* - Ranked first with an FHI score of 67.8, Odisha excelled in Debt Index and Debt Sustainability due to its low fiscal deficit, strong debt management, and effective capital expenditure strategies.
  Chhattisgarh - Achieved the second rank with strengths in Debt Index and revenue growth from mining activities.
  Goa - Positioned third, excelling in Revenue Mobilization due to high tax efficiency and non-tax revenue generation.
- **Aspirational States:** States like Punjab, Kerala, and West Bengal faced challenges in debt sustainability and revenue mobilization, highlighting the need for fiscal reforms.
- **Challenges and Recommendations:** *Revenue Diversification* - States need to enhance their revenue base by tapping into non-tax sources and improving tax compliance.
  Capital Expenditure Focus - Prioritizing investments in infrastructure, health, and education is crucial for long-term growth.
  Debt Management - Adopting a comprehensive debt sustainability framework is essential for reducing fiscal stress.
  Transparency - Enhanced reporting mechanisms and adherence to fiscal responsibility norms will bolster accountability and public trust.
- **Conclusion:** The Fiscal Health Index serves as a vital tool for benchmarking state performance and identifying areas for fiscal improvement. While states like Odisha and Chhattisgarh exemplify strong fiscal discipline, others must adopt targeted strategies to overcome challenges. By fostering fiscal prudence, enhancing revenue mobilization, and ensuring debt sustainability, states can contribute to India's economic resilience and inclusive growth. Under NITI Aayog's guidance, the FHI sets the stage for transformative fiscal reforms, ensuring a balanced and sustainable future for the nation.

GS 2: POLITY, GOVERNANCE, SOCIAL JUSTICE, INTERNATIONAL RELATIONS/INSTITUTIONS

3. The 75-year milestone

Context: This year marks 75 years of the adoption of India's Constitution. The government has planned year-long programmes with the slogan "Hamara Samvidhan, Hamara Swabhiman" – our constitution, our pride. The making of the Constitution was an inspiring saga every Indian should be proud of. Four aspects of our Constitution should invoke that pride – the struggle that preceded its making, the making itself, the content, and the journey in the last 75 years.

Key points

- **Overview:** Last year India celebrated its 75th anniversary of the adoption of its Constitution. This moment serves as a reminder of the historic contributions made by the Constituent Assembly and the enduring framework that has guided the world's largest democracy toward justice, equality, and progress.
- **Background of the Indian Constitution:** *Government of India Act, 1935* - Laid a basic constitutional framework but was rejected by the Indian National Congress for perpetuating British control.
  Cabinet Mission Plan, 1946 - Proposed a Constituent Assembly with representatives from Congress, the Muslim League, and princely states.
- **Achievements of India's Constitution in 75 Years:** *Democratic Foundation* - Established a sovereign, socialist, secular, and democratic republic. Ensures checks and balances among the executive, legislature, and judiciary.
  Protection of Rights - Guarantees Fundamental Rights, promoting equality and social justice. Enabled landmark judgments like Kesavananda Bharati (1973) upholding the Basic Structure Doctrine.
  Economic Reforms - Enabled LPG (Liberalization, Privatization, Globalization) reforms under a constitutional framework. Encouraged policies balancing development with constitutional principles.
  Civic Responsibility - Strengthened civic literacy and responsibilities through movements like Digital India and environmental safeguards.
  Independent Institutions - Maintained the autonomy of bodies like the Supreme Court, Election Commission, and CAG.
- **Some threats to Constitutional Values:** *Decline in Press Freedom* - Ranked 159th in World Press Freedom Index 2024. Increasing censorship and intimidation of dissent.
  Erosion of Individual Rights - Alleged misuse of laws like UAPA and sedition laws. Cases such as Stan Swamy and Umar Khalid highlight rights violations.
- **Way Forward:** *Enhance Democratic Values* - Democracy must emphasize accountability and free speech beyond elections.
  Uphold Directive Principles - Policies must align with socio-economic goals outlined in DPSPs.
  Judicial Independence - Safeguard judiciary's autonomy for upholding constitutional morality.
  Parliamentary Reforms - Revive debates, discussions, and oversight mechanisms in Parliament.
  Civic Engagement - Promote constitutional literacy and citizen participation in governance.
- **Conclusion:** India's Constitution remains a beacon of democratic values and social justice. By addressing emerging challenges, safeguarding institutions, and fostering inclusivity, the nation can ensure that the Constitution continues to guide its progress for generations to come.

GS 3: ECONOMY, ECOLOGY, SCIENCE & TECHNOLOGY, DEFENCE, SECURITY AND DISASTER MANAGEMENT

4. ISRO launch No. 100 is Nav Sat equipped with atomic clocks developed in India

Context: In its 100th launch, the Indian Space Research Organisation (ISRO) is geared to send off a 2,250-kg navigation satellite onboard GSLV-F15 from Sriharikota on January 29. The NVS-02 is the second of five second-generation satellites developed by ISRO to replace the existing satellites in the country's navigation constellation Indian Regional Navigation Satellite System (IRNSS). The new generation of satellite have a longer lifespan of 12 years and are also equipped with indigenously developed, more accurate atomic clocks.

Key points

- **Overview:** Indian Space Research Organisation (ISRO) is all set to launch its 100th mission – the NVS-02 satellite, aboard the Geosynchronous Satellite Launch Vehicle (GSLV) – in January 2025.
- **About NVS-02 Satellite:** NVS-02 will be the second satellite in the series of 2nd-generation navigation satellites and the 9th satellite in the Navigation with Indian Constellation (NavIC).
  Launch vehicle - GSLV Mark II
- **Payloads of NVS-02:** *Navigational payload* - Navigational payload transmits signals to users on Earth. It does so use three bands in the spectrum - L1, L5, and S band. A Rubidium atomic clock is on-board NVS-02.
  Ranging payload - Ranging payload consists of a transponder. This helps in providing seamless and non-stop service irrespective of weather conditions on Earth.
- **Significance of 2nd generation satellites:** 2nd-generation satellites in NavIC will send signals in a third frequency (L1) besides the L5 and S, thus increasing interoperability with other satellite-based navigation systems. 2nd-generation satellites have a much more robust encryption system to keep all communications completely secure. These satellites will have a longer mission life of more than 12 years. 1st generation satellites have a mission life of 10 years.
- **NavIC:** NavIC (Navigation with Indian Constellation) is the independent stand-alone navigation satellite system of India. It was earlier known as IRNSS (Indian Regional Navigation Satellite System).
  Features - NavIC consists of a constellation of seven satellites. Three satellites are in the geostationary orbit and the remaining four are in geosynchronous orbits around the Earth: IRNSS-1A, IRNSS-1B, IRNSS-1C, IRNSS-1D, IRNSS-1E, IRNSS-1F, and IRNSS-1G.
  Developed by - Indian Space Research Organisation (ISRO).
- **Types of services by NavIC:** *Standard Positioning Service* - Available to all users and provides positioning accuracy of around 20 meters throughout the Indian region and within the primary service area.
  Restricted Service - Encrypted service primarily intended for authorised users such as the military, government agencies, and other security-sensitive applications.
- **NavIC over global competitors:** Enhances India's military capabilities by providing accurate real-time navigation data for defence applications like weapon guidance, fleet management and location-based services, reinforces national security and safeguards territorial integrity. NavIC signals come to India at a 90-degree angle, making it easier for them to reach devices located even in hard-to-reach areas like congested areas, dense forests, or mountains. In contrast to this, the GPS signals (satellites placed in Medium Earth Orbit) are received over India at lower angles.

GS 3: ECONOMY, ECOLOGY, SCIENCE & TECHNOLOGY, DEFENCE, SECURITY AND DISASTER MANAGEMENT

5. Pralay, India's first quasi-ballistic missile, to be showcased at Republic Day parade

Context: The Defence Research and Development Organisation (DRDO) is set to showcase "Pralay", an indigenous short-range quasi-ballistic missile, at the Republic Day parade in New Delhi on Sunday. Meant for the Army and the Air Force, Pralay is the first ballistic missile in India's arsenal for conventional strikes. The Army's Battle Surveillance System "Sanjay" will also be part of the parade. In 2023, the Defence Acquisition Council (DAC) approved procurement of the Pralay tactical ballistic missiles with a range of 400 km and Nirbhay long-range subsonic land attack cruise missiles with a range of 1,000 km, both of which will give a long-range conventional strike option for the Indian military.

Key points

- **About Pralay Missile:** It is an indigenously developed short-range, quasi-ballistic surface-to-surface missile. It has been developed by the Defence Research and Development Organisation (DRDO) based on the Prithvi Defence Vehicle from the Indian ballistic missile programme. It has been developed for deployment along the Line of Actual Control (LAC) and Line of Control (LoC).
- **Project Sanjay:** It is one of the series of automation projects to improve efficiency in operation, functions, human resource management, logistics, inventory management, medical services and other administrative functions. It also enhances battlefield awareness for commanders on the ground.
- **Tactical Missiles:** Generally, short-range missiles are termed tactical while long-range missiles are termed strategic. A missile which is used to destroy tactical targets of enemy like bunkers, mortar position, artillery position etc. is tactical missile.
  - *Versatile range* - Tactical missiles fill the gap between long range rockets and short-range ballistic missiles and have range mainly about 100 to 200 kms.
  - *Very high precision and accuracy* - These missiles are highly accurate and can destroy small steady and moving targets with high accuracy.
- **Unique features of Pralay:** *Precise targeting* - The missile is designed to destroy enemy radar, communication installations, command centres and airfields.
  Quasi Ballistic Trajectory - It means the object takes a low curved path after being shot.
  Stealth features - Pralay could evade any anti-ballistic missile (ABM) interceptors by performing mid-air manoeuvres by using a manoeuvrable re-entry vehicle.
  Destruction capability - When a high-explosive warhead, like the one Pralay missile is equipped with, explodes, its pieces are thrown at a high speed which can inflict heavy damage.
- **Significance of the missile system:** The Indian missile can be compared to China's Dong Feng 12 and the Russian Iskander missile that has been used in the ongoing war with Ukraine. The US Army is in the process of increasing the range of a similar short-range ballistic missile called the Precision Strike Missile (PrSM).
- **Way forward:** Pralay, along with the BrahMos supersonic cruise missile, will form the crux of India's planned Rocket Force — a concept that was envisaged by former Chief of Defence Staff (CDS), the late General Bipin Rawat. Only conventional missiles would come under the planned Rocket Force as and when it's ready, while nuclear weapons would continue to be under the ambit of the Strategic Forces Command.