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Daily Current Affairs

🎯 To The Point

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NEWS

1 ISRO Successfully Conducts Power Head Test for Semi-Cryogenic Engine

Context: The **Indian Space Research Organisation (ISRO)** has achieved a significant milestone by successfully conducting the **Power Head Test Article (PHTA)** for its **SE2000 semi-cryogenic engine**. This test is a crucial step in advancing India's space propulsion technology.

Understanding the Power Head Test Article (PHTA):

Purpose of PHTA:

The PHTA serves to **validate the integrated performance** of essential subsystems, including:

- **Gas Generator**
- **Turbo Pumps**
- **Pre-burner**
- **Control Components**

Significance of PHTA:

This test is **critical for the development** of ISRO's **semi-cryogenic engine**, ensuring reliability and efficiency in future space missions.

The Role of Cryogenic Stages in Space Launch Vehicles:

A **cryogenic engine** is the **final stage** of a launch vehicle, utilizing **cryogenic fuels stored as liquids** instead of gases. In space, where oxygen is absent, rockets carry their own **oxidiser** to support combustion.

What is Cryogenics?

Cryogenics involves the study of materials at **extremely low temperatures (below -150°C)** and utilizes **cryogenic fluids** such as:

- **Liquid Nitrogen (LN2)**
- **Liquid Oxygen (LOX)**
- **Liquid Hydrogen (LH2)**

Applications of Cryogenics:

Cryogenics has diverse applications across multiple fields, including:

- **Space Exploration**
- **Medical Technology**
- **Food Preservation**
- **Industrial Gas Production**
- **Superconductivity**

Semi-Cryogenic Engine: A Game-Changer:

Propellants Used:

- Utilizes **Liquid Oxygen (LOX)** and **Kerosene**, making it **safer and less toxic** compared to **cryogenic engines** that use **liquid hydrogen**.

Key Advantages:

- **Higher Thrust**: Delivers a **powerful 2,000 kiloNewtons (kN)** thrust.

- **Increased Payload Capacity**: Due to the **lighter kerosene fuel**, it enhances payload capability for launch vehicles.

Cryogenic vs. Semi-Cryogenic Engines: Key Differences

Feature	Cryogenic Engine	Semi-Cryogenic Engine
Propellants	LOX & LH2	LOX & Kerosene
Storage Temperature	-253°C for LH2	Kerosene stored at normal temperature
Thrust	Higher specific impulse, lower density	Higher density impulse, more thrust per volume
Complexity	Complex handling & storage	Easier to handle & store
Reusability	Lower potential	Higher potential due to simpler components

Next-Generation Launch Vehicle (NGLV): Paving the Future:

ISRO is developing the **Next Generation Launch Vehicle (NGLV)**, a **human-rated** rocket designed for **future space missions, including Gaganyaan**.

Key Features of NGLV:

- **High Payload Capacity**: Can carry up to **30 tons to Low Earth Orbit (LEO)**.

- **Reusable First Stage**: Enhances cost-efficiency and sustainability.

- **Advanced Propulsion**:

  o **First & Second Stages**: Powered by **LOX engines**.

  o **Upper Stage**: Equipped with a **cryogenic engine**.

Successful Recovery Tests:

ISRO has successfully demonstrated the **recovery of the first stage** of the **NGLV**, a crucial step towards developing a **fully reusable launch system**.

Conclusion:

The successful **PHTA test for the semi-cryogenic engine** marks a major leap forward in **India's space capabilities**. With advancements in **semi-cryogenic propulsion and reusable launch technology**, ISRO is positioning itself for **future deep-space exploration and human spaceflight missions**.

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2 **Pashu Aushadhi Kendras: Affordable Veterinary Medicines Under LHDCP**

Context: The government is set to establish **'Pashu Aushadhi' stores** across India to offer **affordable generic veterinary medicines**. This initiative is a crucial part of the revised **Livestock Health and Disease Control Programme (LHDCP)**, recently approved by the **Union Cabinet led by PM Modi**.

Inspired by the Success of Janaushadhi Kendras:

Janaushadhi Kendras: A Proven Model

The **Pashu Aushadhi initiative** is based on the successful model of **Pradhan Mantri Bharatiya Janaushadhi Kendras (PMBJKs)**, which provide **low-cost generic medicines** for humans.

Current Reach of Janaushadhi Kendras:

- **Over 10,300 PMBJKs** operate across India under the **Ministry of Chemicals and Fertilisers**.
- **Janaushadhi Diwas** is observed on **March 7**.

Extending Benefits to Animal Healthcare:

While **PMBJKs** cater to human healthcare, **Pashu Aushadhi Kendras** will provide **cost-effective, non-branded veterinary medicines** to support farmers and livestock owners.

Enhancing Livestock Health Through LHDCP:

The **Union Cabinet**, chaired by **PM Modi**, has revised the **Livestock Health and Disease Control Programme (LHDCP)** to strengthen animal healthcare and **disease prevention**.

Key Components of LHDCP:

1. **National Animal Disease Control Programme (NADCP)** – Focuses on eliminating major livestock diseases.

2. **Livestock Health & Disease Control (LH&DC)** – Includes three sub-components:
   - **Critical Animal Disease Control Programme (CADCP)** – Targets severe livestock diseases.
   - **Veterinary Hospital & Dispensary Strengthening (ESVHD-MVU)** – Provides **mobile veterinary services** for doorstep animal healthcare.
   - **Assistance to States for Disease Control (ASCAD)** – Supports state-level disease prevention initiatives.

3. **Pashu Aushadhi Kendras (New Component)** – Enhances access to **affordable veterinary medicines** via **PM-Kisan Samriddhi Kendras** and **Cooperative Societies**.

Financial Allocation:

The **total budget** for **LHDCP (2024-2026)** is ₹**3,880 crore**, with ₹**75 crore** earmarked for **Pashu Aushadhi Kendras** to ensure availability of **affordable veterinary medicines**.

Impact and Benefits of LHDCP:

Key Objectives:

- **Disease Prevention** – Controls major diseases like **Foot and Mouth Disease (FMD), Brucellosis, PPR, Classical Swine Fever, and Lumpy Skin Disease** through vaccination and immunization.

- **Enhanced Veterinary Infrastructure** – Strengthens disease surveillance and mobile veterinary services.

- **Economic and Social Growth** –
    o Increases **livestock productivity**
    o **Prevents financial losses** for farmers
    o Generates **rural employment**
    o Encourages **entrepreneurship** in veterinary services

Significance of Pashu Aushadhi Kendras:

India's Vast Livestock Population:

According to the **20th Livestock Census (2019)**, India has a **livestock population of 535.78 million**, including **302.79 million bovines** (cattle, buffalo, mithun, and yak).

Challenges Posed by Livestock Diseases:

Common diseases such as **Foot and Mouth Disease (FMD), Brucellosis, Peste des Petits Ruminants (PPR), Cerebrospinal Fluid (CSF), and Lumpy Skin Disease** cause **significant productivity losses**.

Despite vaccination efforts, **farmers still bear high out-of-pocket expenses** on veterinary medicines, highlighting the need for **affordable alternatives** like Pashu Aushadhi Kendras.

Integrating Traditional Veterinary Medicine:

Ethnoveterinary Practices at Pashu Aushadhi Kendras

Apart from generic medicines, **Pashu Aushadhi Kendras** will offer **ethnoveterinary remedies** rooted in **traditional knowledge** for treating livestock ailments.

Compilation of Indigenous Treatments:

The **National Dairy Development Board (NDDB)** has documented **traditional herbal formulations** to treat conditions such as:

- **Mastitis**
- **Foot and Mouth Disease (FMD)** – Treats mouth and foot lesions
- **Fever & Diarrhoea** in livestock

Key Ingredients in Ethnoveterinary Medicine:

Natural formulations include:

> oriander, Garlic, Bay Leaves, Pepper, Cumin, Turmeric, Chirata, Betel, Tulsi, Neem, Sweet Basil, Jaggery, and Onions

These ingredients have been traditionally used to **treat infections, fever, and digestive issues in animals**.

Conclusion: The launch of **Pashu Aushadhi Kendras** is a transformative step in **India's veterinary healthcare system**, ensuring **affordable and accessible medicines** for livestock owners. By integrating **modern medicine with traditional remedies**, this initiative will **boost livestock productivity, reduce economic losses, and enhance rural livelihoods**.

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GS Paper 2 – International Relation

3 **USAID Funding Cuts in India: Impact on Health, 5G, and Development Initiatives**

Context: US President Donald Trump announced the implementation of reciprocal tariffs on trade partners starting April 2, regardless of their economic status. In his Joint Address to Congress, he criticized both friendly and unfriendly nations, including India, China, and the European Union, for imposing higher tariffs on US products. Trump highlighted India's over 100% auto tariffs and claimed that countries like China and South Korea impose significantly higher duties compared to the US. He argued that these disparities have persisted for decades, despite US military and economic support to some of these nations.

Current Status of Trade Between India and USA:

As per U.S. estimates, the U.S. total goods trade with India was an estimated $129.2 billion in 2024.

- The U.S. goods exports to India in 2024 were $41.8 billion, up 3.4% ($1.4 billion) from 2023.
- U.S. goods imports from India totalled $87.4 billion in 2024, up 4.5% ($3.7 billion) from 2023.
- The U.S. goods trade deficit with India was $45.7 billion in 2024, a 5.4% increase ($2.4 billion) over 2023.

Uncertainty for India Amid US Tariff Plans:

US President Donald Trump reiterated his criticism of India's high tariffs, particularly in the auto sector, where duties exceed 100%. His remarks signal that ongoing trade negotiations may not secure concessions for India, especially on reciprocal tariffs set to take effect from April 2.

Bilateral Trade Agreement at Risk:

India and the US are working on a bilateral trade agreement (BTA), with Indian officials seeking relief from tariffs, including the 25% duty on steel and aluminum. Commerce Minister Piyush Goyal is in the US to discuss the issue with United States Trade Representative (USTR) who is overseeing Trump's tariff policies.

Concerns Over US Commitment to Trade Deals:

Trade experts warn that Trump's tariff decisions, such as the 25% duties on Canada and Mexico, indicate a disregard for WTO norms and existing trade agreements. The imposition of these tariffs raises doubts about America's adherence to future trade deals, including one with India.

The North American Free Trade Agreement (NAFTA), the trade deal between the US, Canada, and Mexico, had been in place since January 1994. However, Trump was dissatisfied with its terms and, during his first term, replaced it with the United States-Mexico-Canada Agreement (USMCA) in 2018-19. Trump's tariffs on Canada and Mexico violate USMCA and highlight his disregard for negotiated trade agreements.

Farm Sector Vulnerability Amid US Tariff Plans:

India's agricultural sector is highly vulnerable to US reciprocal tariffs due to significant differences in tariff rates between the two countries. Farmers' unions continue to push for a legally guaranteed Minimum Support Price (MSP), adding to the sector's sensitivity.

High Tariff Disparity Between India and the US:

According to an ICRIER report, India imposes an average tariff of 17% compared to 3.3% by the US. The gap is even wider in agriculture, where India's simple average tariff is 39% and the trade-weighted rate is 65%, while the US maintains much lower rates of 5% and 4%, respectively.

Auto and Pharma Sectors Face Tariff Risks:

India's automobile and pharmaceutical sectors, among its most successful industries, face potential setbacks due to US reciprocal tariffs. With countries demanding greater access to India's protected markets, these industries may see higher costs and reduced competitiveness in the US.

Strategies for Indian Industries:

A GTRI report suggests that Indian firms should explore alternative export markets such as Europe, Southeast Asia, and Africa, where tariff barriers are lower. Additionally, forming joint ventures with American firms or setting up assembly units in the US could help mitigate the impact of tariffs.

US Challenges WTO's Relevance and Policies:

The US 2025 Trade Policy Agenda, released on March 3, claims that the World Trade Organization (WTO) is losing its relevance and has deviated from its original purpose of promoting open, market-oriented trade.

The document criticizes the WTO's Special and Differential Treatment (SDT) provisions, which allow developing countries like India to access benefits such as extended transition periods, higher tariff bindings, and subsidies. It argues that nations can claim SDT status by self-declaring as 'developing,' without objective criteria.

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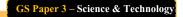TOGETHER WE SCALE HEIGHTS

4 AI Kosha: India's Secure AI Data Platform

Context: The **Ministry of Electronics & Information Technology (MeitY)** has launched **AI Kosha**, a **secure AI datasets platform**, along with the **IndiaAI Compute Portal**, to accelerate AI research and development in India.

Announced on the **IndiaAI Mission's anniversary**, this initiative aims to **democratize AI access**, enhance **AI competency in governance**, and support **AI startups and researchers** by providing seamless access to AI datasets and tools.

What is AI Kosha?

AI Kosha is a **centralized and secure AI innovation platform** designed to **facilitate AI research and development** in India. It provides access to **high-quality datasets, AI models, and development tools**, empowering researchers, startups, and enterprises to build cutting-edge AI solutions.

- **Developed By**: **MeitY** under the **IndiaAI Mission**

Key Features of AI Kosha:

AI Dataset Repository:

- Hosts **300+ datasets** and **80+ AI models** to accelerate AI research and development.

AI Sandbox Environment:

- Provides an **integrated development environment (IDE)** with essential tools and tutorials for **AI model training**.

Content Discoverability:

- Uses **AI-readiness scoring** to help researchers find the most relevant datasets.

Advanced Security & Access Control:

- Implements **data encryption** (both **at rest and in motion**) to ensure secure data handling.
- Offers **API-based secure access** and **real-time malicious traffic filtering** to protect data integrity.

Permission-Based Access:

- Features **tiered access levels** for **researchers, startups, and government agencies**, ensuring responsible data usage.

Benefits of AI Kosha:

Accelerates AI Research:

- Provides **high-quality datasets and pre-trained models**, reducing the time required for AI development.

Enhances AI Innovation:

- Enables **startups, researchers, and enterprises** to build **real-world AI solutions** efficiently.

Strengthens AI Security:

- Promotes **ethically sourced, consent-based datasets**, ensuring **responsible AI development**.

Boosts AI Adoption in Public Sector:

- Supports AI-driven applications in **governance, healthcare, and education**, improving public services.

Challenges & Limitations:

Limited Dataset Variety:

- Currently, most datasets are sourced from **government and research institutions**, limiting access to **real-world commercial data**.

Access Restrictions:

- Strict **security protocols** may create challenges for **private-sector innovators** seeking seamless data retrieval.

Early-Stage Development:

- AI Kosha is still **evolving**, requiring **greater industry participation** for wider expansion and adoption.

Conclusion:

With **AI Kosha**, India is taking a significant step towards **building a robust AI ecosystem**, fostering innovation, and ensuring **secure and responsible AI development**. As the platform evolves, **collaboration between government, academia, and industry** will be key to unlocking its full potential.

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GS Paper 1 – Geography

5 | Protests Halt Basalt Mining in West Bengal

Context: The **basalt mining** activities at the **Deocha-Pachami-Dewanganj-Harisingha (DPDH) coal project** in **Birbhum district, West Bengal**, have been **halted** due to intense **protests by local villagers**. The opposition stems from concerns about environmental degradation and the impact on livelihoods.

Understanding Basalt Mining:

Basalt mining involves the extraction of **basalt rock**, a **dense, durable volcanic stone** used in various **industrial applications**. The primary method of extraction is **quarrying**, which involves digging deep trenches or pits to access **basalt deposits**.

Environmental Concerns:

Mining operations have several **environmental implications**, including:

- **Air Pollution**: Emissions from mining equipment, vehicular movement, and dust from unpaved roads contribute to poor air quality.

- **Soil Degradation**: Continuous quarrying affects soil fertility and landscape stability.

- **Carbon Sequestration Potential**: Interestingly, **basalt naturally absorbs CO_2** from the atmosphere, locking it within its mineral structure. Using basalt in **construction** helps store **CO_2 long-term**, offsetting carbon emissions.

Key Applications of Basalt:

Due to its **hardness and durability**, basalt is widely used in various industries:

- **Construction**: Used in **building blocks, tiles, and slabs**.

- **Agriculture**: **Crushed basalt** acts as a **natural fertilizer**, rejuvenating weathered soils and enhancing plant growth.

- **Infrastructure**: **Geogrid meshes** made from **basalt fibers** reinforce roads, improving stability and extending road lifespan.

- **Insulation**: **Basalt fibers** serve as **thermal and acoustic insulators**, improving **energy efficiency** in buildings.

Major Basalt Zones and Mines in India:

1. **Deccan Traps**: One of the largest **volcanic provinces**, covering most of **west-central India**.

2. **Deocha-Pachami Coal Block**: India's **largest coal reserve**, containing **12.31 billion tonnes** of **coal and basalt deposits**.

3. **Rajmahal Basalts**: Located in the **Rajmahal Hills of Jharkhand**, extending into the **Bengal Basin**.

4. **Bombay Area Basalts**: Found in **Mumbai, Salsette, and Trombay**, belonging to the **Upper Deccan Group**.

The recent protests at **Deocha-Pachami** highlight the ongoing debate between **economic development** and **environmental sustainability**. The future of **basalt mining** in this region will depend on how authorities balance these concerns.

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6 Could Europe's Eutelsat Replace Starlink in Ukraine?

Context: Ukraine has been heavily reliant on **Elon Musk's Starlink satellite internet** to maintain **military communications** after its traditional **fixed-line and mobile networks** suffered damage from **Russian airstrikes**. Starlink has also played a crucial role in ensuring **civilian internet access** across the country.

However, concerns over a potential **loss of Starlink access** have fueled discussions about alternative providers, with a strong focus on **Eutelsat**, a European competitor.

Eutelsat: A Viable Alternative?

- **Who is Eutelsat?**

  Eutelsat, a **Franco-British satellite company**, has been providing **satellite communication services in Ukraine**. After **merging with OneWeb in 2023**, it became the only other operator with an **active Low Earth Orbit (LEO) satellite constellation**, apart from Starlink.

- **Network Capabilities:**

  o Eutelsat operates around **630 LEO satellites**, complemented by **35 geostationary satellites**.

  o While **Starlink offers speeds up to 200 Mbps**, Eutelsat provides speeds of **150 Mbps**.

  o Eutelsat's services are **more expensive**, with terminals costing up to **$10,000**, compared to **Starlink's $589**, and monthly plans ranging from **$95 to $440**.

Other Satellite Internet Alternatives:

- **SES (Luxembourg):**

  o SES provides services through its **O3b mPOWER constellation** in **Medium Earth Orbit (MEO)**.

  o While mainly catering to **corporate, government, and military clients**, it **does not offer direct-to-consumer services** like Starlink and Eutelsat.

With **growing geopolitical tensions**, the future of **Ukraine's satellite connectivity** remains uncertain, making **Eutelsat a potential, yet costlier, alternative to Starlink.**

ASI's Underwater Exploration Off Dwarka Coast:

Project Overview:

The **Archaeological Survey of India (ASI)** has launched a fresh phase of **underwater exploration** off the **Dwarka coast in Gujarat** to uncover and safeguard **India's submerged cultural heritage**. The **Ministry of Culture** officially announced the initiative.

Expert Team Leading the Mission:

A team of **five archaeologists** is conducting the survey near **Gomati Creek** under the leadership of:

- **Prof. Alok Tripathi** – Additional Director-General (Archaeology)

- **H.K. Nayak** – Director (Excavations and Explorations)

- **Dr. Aparajita Sharma** – Assistant Superintending Archaeologist

- **Poonam Vind** and **Rajkumari Barbina**

This marks a **historic first** with significant participation of **women archaeologists** in an **ASI-led underwater mission**.

Renewed Focus on Underwater Archaeology:

- The project is part of the **revived Underwater Archaeology Wing (UAW)** of ASI, dedicated to **offshore surveys and underwater excavations** in **Dwarka and Bet Dwarka**.

- Since the **1980s**, the UAW has led several key explorations, including:

  o **Bangaram Island (Lakshadweep)**

  o **Mahabalipuram (Tamil Nadu)**

  o **Loktak Lake (Manipur)**

  o **Elephanta Island (Maharashtra)**

Collaborations and Previous Discoveries:

- **ASI has worked closely with the Indian Navy and other research organizations** to protect **submerged heritage sites**.

- **Between 2005 and 2007,** ASI's offshore excavations in Dwarka uncovered **stone sculptures and anchors**, laying the groundwork for further exploration.

Preserving India's Submerged Legacy:

The ongoing **underwater investigations** are crucial in **understanding ancient structures** submerged along the **Dwarka coastline**. The findings from this research could offer **valuable insights into India's rich maritime history and cultural heritage.**