Today's Prelims Topics

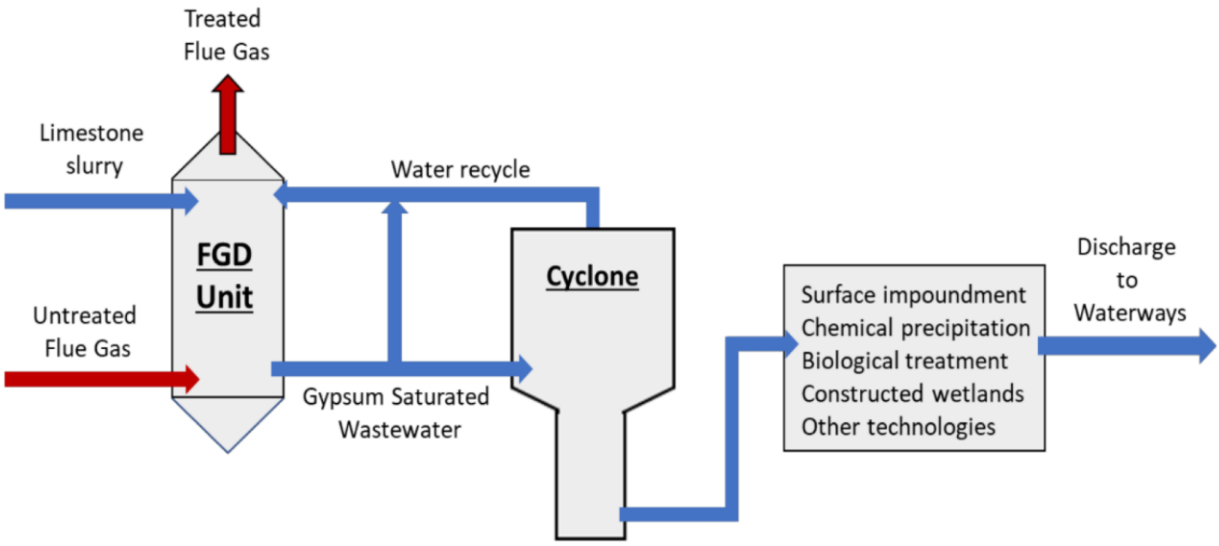
Flue Gas Desulphurisation (FGD)

Context

92% of India's 600 coal-based power units are yet to install FGDs.

About Flue Gas Desulphurisation (FGD)

- FGD refers to a set of technologies designed to remove sulfur dioxide (SO_2) from the exhaust flue gases of fossil-fuel power plants and other industrial processes.
- The primary goal is to reduce **SO_2 emissions,** which contribute to acid rain and respiratory problems.
- It uses various methods such as **Wet scrubbing, Dry Scrubbing** etc.
- **Advantages of FGD:**
    - It can remove up to 90% or more of SO_2 from flue gases.
    - The gypsum (byproduct) produced can be used in the construction industry, reducing waste.
    - It helps power plants meet stringent environmental regulations regarding SO_2 emissions.
- **Challenge**
    - FGD systems are **capital-intensive**, with significant **maintenance requirements.**
    - Wet FGD systems require excess water, which can be a concern in water-scarce regions.



Data Related to FGD Installation in Indian Thermal Power Plants (TPPs)

- **Total coal-based TPP units in India:** ~600 units
- **Units that have installed FGD systems:** Only **8%** (~48 units)
- **Units yet to install FGDs: 92%** (~552 units)
- **Category A Plants** (within 10 km of NCR or cities with 1 million+ population):
    - Total: **66 plants**
    - Installed FGD: Only **14 plants**
    - Compliance deadline: **By 2027**

Source: The Hindu

National Polio Surveillance Network (NPSN)

Context

The government plans to gradually wind down **National Polio Surveillance Network** centres across India as part of its **post-polio transition strategy**.

About National Polio Surveillance Network (NPSN)

- The **National Polio Surveillance Project (NPSP)** is a collaborative initiative between the **Government of India** and the **World Health Organization (WHO)**, established in **1997**.
- Its primary objective was to implement a sensitive surveillance system for poliovirus, playing a pivotal role in India's journey toward polio eradication.
- **Last Reported Case:** India reported its final case of wild poliovirus on **January 13, 2011**, marking a significant turning point in the nation's public health history.
- **Polio-Free Certification:** Following three consecutive years without any new cases, the **WHO** declared India polio-free on **March 27, 2014**.
- **Regional Achievement:** This success contributed to the **WHO South-East Asia Region** being certified polio-free in **2014**, underscoring the effectiveness of collaborative public health efforts.

Polio Eradication

- **Global Progress:** Polio cases have dropped by over 99% since the 1988 launch of GPEI, from 3.5 lakh to under 1,000 cases annually.
- **India's Strategy:** Used both OPV and IPV; OPV was preferred for mass use due to ease and gut immunity.
- **Oral Polio Vaccine (OPV):**
    - Given by mouth.
    - Contains a weakened (live) virus.
    - Easy to administer, low cost.
    - Induces strong intestinal immunity, helping stop transmission.
    - Used in mass immunization campaigns.
- **Inactivated Poliovirus Vaccine (IPV):**
    - Given as an injection.
    - Contains killed virus.
    - Safe for immunocompromised individuals.
    - Provides strong individual immunity but less effective at stopping transmission.

Source: TheHindu

Why Do Volcanoes Erupt?

Context

Recently Mount Etna in Italy erupted.

Why do Volcanoes Erupt?

- **Magma Formation:** Deep inside the Earth, high temperature and pressure melt mantle rocks to form **magma**.
- **Magma Ascent:** Magma is **less dense** than solid rock, so it **rises** and accumulates in underground chambers.
- **Volatile Compounds:** Water vapour, CO_2, SO_2, and other gases dissolve in magma under pressure.
- **Bubble Formation:** Near the surface, pressure drops, gases escape and form **bubbles**, increasing internal pressure.
- **Pressure Release:** Faults or tectonic boundaries allow pressure to escape, leading to **violent eruptions**.
- **Bottlenecks:** If magma is blocked, **seismic activity** increases as pressure builds.

Types of Volcanoes by Activity

- **Active:** Currently erupting or likely to erupt (e.g., Mount Etna, Italy).
- **Dormant:** Not erupted recently but may erupt in future (e.g., Mount Fuji, Japan).
- **Extinct:** Unlikely to erupt again.
- **Zombie Volcanoes:** No eruption for thousands of years, but still emit gases and seismic signals (e.g., **Uturuncu**, Bolivia).

Recent Examples of Volcanic Eruption

- **Mount Etna**, Italy – Frequent eruptions (2021, 2023).
- **La Palma**, Canary Islands (Spain) – Major eruption in 2021, causing evacuations.
- **Hunga Tonga**, Tonga – Massive undersea eruption in Jan 2022, caused tsunamis across the Pacific.
- **Mount Semeru**, Indonesia – Erupted multiple times (2021–2023), deadly pyroclastic flows.
- **Mt. Pinatubo**, Philippines – Historic 1991 eruption, affected global temperatures.

Pacific Ring of Fire
Horseshoe-shaped zone of intense **seismic and volcanic activity** around the Pacific Ocean basin.
Has **75% of world's active volcanoes** and **90% of earthquakes**.
Formed due to **subduction zones** and **plate tectonics** (e.g., Pacific Plate with Philippine, Eurasian, and Indo-Australian plates).
Countries: **Japan, Indonesia, Philippines, New Zealand, Chile, USA (Alaska, California), Peru, etc.**

Source: TheHindu

UNSC

Context

On June 2025, the UN General Assembly elected five countries as non-permanent members of the UN Security Council (UNSC) for the 2026–2027 term – Bahrain, Colombia, Democratic Republic of Congo, Latvia, And Liberia

- These will replace outgoing members: Algeria, Guyana, Sierra Leone, Slovenia, and South Korea (from January 1, 2026).

About UNSC

- **Total Members**: 15
    - **5 permanent** (P5): China, France, Russia, UK, USA
    - **10 non-permanent**: Elected for **2 years**, no immediate re-election.
- **Functions**:
    - Maintains **international peace & security**
    - Can impose **sanctions**, authorize **military action**, establish **peacekeeping missions**
- **Voting**:
    - For procedural matters: **9/15** votes required
    - For substantive matters: **9/15**, **including all 5 permanent members** (P5 have **veto power**)
- Election Process for Non-Permanent Members:
    - Elected by **UN General Assembly** (2/3 majority).
    - Seats are allocated by **regional groups**:
        - Africa – 3
        - Asia-Pacific – 2
        - Latin America & Caribbean – 2
        - Western Europe & Others – 2
        - Eastern Europe – 1

Permanent Membership for India

- India has been a member of the United Nations Security Council (UNSC) multiple times as a non-permanent member.
- India is part of the G4 nations (with Brazil, Germany, and Japan) advocating for UNSC reform to become a permanent member.
- India has broad international support (including from the U.S., France, Russia, and others) but faces opposition from some countries (e.g., China, Pakistan).

Source: The Hindu

New Protections for Ladakh

Context

The Centre has notified new regulations for Ladakh

Background

- Ladakh became a **Union Territory (UT)** in **2019** after the abrogation of **Article 370** and the **J&K Reorganisation Act**.
- **Demand for Sixth Schedule**: Over **90% of Ladakh's population** belongs to **Scheduled Tribes (STs)**, leading to demands for **autonomy** under the **Sixth Schedule** (like Northeastern states).
- **Protests**: Led by **Leh Apex Body (LAB)** and **Kargil Democratic Alliance (KDA)**, including climate activist **Sonam Wangchuk's hunger strike**.

Key Provisions of New Regulations (2025)

- **Ladakh Civil Services (Amendment) Regulation, 2025: Domicile requirement** for govt jobs:
  - 15 years residency **OR**
  - 7 years of education in Ladakh + Class 10/12 exams.
  - Children of central govt employees (10+ years service) also eligible.
  - **Issuing authority**: Deputy Commissioner.
- **UT of Ladakh Reservation (Amendment) Regulation, 2025**
  - **Total reservation capped at 85%** (SC/ST/OBC + socially backward groups).
  - **Excludes 10% EWS quota**.
  - **Professional colleges**: SC/ST/OBC quota raised from **50% to 85%**.
- **Ladakh Official Languages Regulation, 2025**
  - **Official languages**: English, Hindi, **Bhoti, Purgi**.
  - **Promotion of local dialects**: Shina, Brokkat, Balti, Ladakhi.
- **Ladakh Autonomous Hill Development Councils (Amendment) Regulation, 2025: 1/3rd seats reserved for women** (rotational basis) in **Leh & Kargil councils**.

Significance of the Regulations

- First **legal framework** for Ladakh since **2019 UT creation**.
- Addresses **job reservations**, **language recognition**, and **women's representation**.
- **Falls short of Sixth Schedule demands**:
  - **No land protection** (outsiders can still buy land).
  - **No legislative powers** for Hill Councils (only administrative).
  - **Executive orders (Article 240)** can be revoked (unlike constitutional safeguards).

Criticism & Pending Demands

- **No Sixth Schedule Status**: Lack of **constitutional autonomy**.
- **Land & Environment**: No safeguards against **tourism/commercial exploitation**.
- **Domicile Duration**: Activists demand **30 years** instead of 15.

Source: Indian Express

News in Short

Lady's-Slipper Orchid

News? Seen growing wild in the U.K. for the **first time in 100 years**.

About it

- **Species:** Lady's-slipper orchid
- **Appearance:** Yellow cup-shaped flower with purple petals
- **Status:** Once thought extinct in the U.K. (by early 1900s) due to over-picking
- **Rediscovery:** First wild sighting in **100 years** reported in **Yorkshire Dales**, U.K. (2025)
- **Significance:**
  - Result of **decades-long conservation efforts**
  - Reintroduction success: wild germination from planted orchids
  - Hopes for full restoration across former northern England range

Source: The Hindu

Places in News

Praid (Romania)

News? On **June 2**, the **Corund River** flooded parts of the **Praid salt mine**, one of Europe's largest salt reserves.

Location (Praid):

- **Country:** Romania
- **Region:** Harghita County, central Romania
- **Famous for:**
  - **Praid Salt Mine** – major tourist and health destination
  - Located in the **Eastern Carpathians**
  - Near the **Corund River**

Source: TheHindu

Editorial Summary

Strengthening the India-Australia Defence Partnership in a Shifting Global Order

Context

- Donald Trump's potential return and changing global power dynamics highlight the need for resilient partnerships.
- India and Australia, with aligned interests, must deepen defence cooperation to ensure regional security and stability.

Why India Should Strengthen Security Partnership with Australia

- **Shared Concerns over China's Assertiveness:** Both nations face strategic challenges from China, making collaboration essential for counterbalancing regional power shifts.
- **Geostrategic Complementarity:** Australia's location bridges the Indian and Pacific Oceans, supporting India's maritime ambitions and Indo-Pacific outreach.
- **Proven Operational Synergy:** Existing frameworks like CSP 2020, the 2+2 Dialogue, and joint exercises (AUSINDEX, AUSTRAHIND, Malabar) show operational compatibility and trust.
- **Reliable Middle Power Alliance:** In an uncertain global security environment, Australia offers a dependable alternative to over-reliance on the U.S.
- **Defence Technology and Industrial Cooperation:** Australia's advanced defence ecosystem, including its MSME sector, aligns well with India's indigenisation drive and tech ambitions.
- **Influence in the Pacific:** Australia's established relations with Pacific Island nations complement India's growing regional diplomatic and security interests.

What Steps India Must Take

- **Expand Joint Military Engagement:** Break service silos through large-scale tri-service joint exercises and establish a dedicated joint staff forum.
- **Upgrade Defence Representation in Canberra:** Elevate India's Defence Adviser post to a one-star rank and deploy dedicated Army and Air Force assistants.
- **Encourage Bottom-Up Strategic Dialogue:** Include more uniformed professionals and operational experts in bilateral discussions; enable classified discussions and war-gaming exchanges.
- **Collaborate on Naval MRO and Manufacturing:** Partner on maintenance, repair, and overhaul (MRO) for naval assets; co-develop patrol boats for small island nations.
- **Align MSME Ecosystems:** Facilitate defence startup collaborations and tech-sharing through an India-Australia MSME defence corridor or a model like INDUS X.
- **Deepen Indo-Pacific Outreach Together:** Jointly support security and development in the Indian Ocean Region and Pacific Islands, showcasing responsible regional leadership.

Source: The Hindu: India-Australia defence ties beyond American shadows

India's Energy Transformation

Context

India has become the world's fourth-largest economy, driven by reform-led growth. Central to this rise is a transformed energy sector, now a pillar of sovereignty, self-reliance, and sustainable development.

Why India Must Strengthen Its Energy Sector

- **Accelerating Demand:** Energy demand is projected to **rise 2.5x by 2047**, contributing **25% of global incremental demand**.
- **Strategic Sovereignty:** Energy security **equates to national development security**, especially in a geopolitically turbulent world.
- **Economic Growth Engine:** With GDP at $4.3 trillion, uninterrupted energy flow is vital for sustaining India's global economic momentum.
- **Self-Reliance & Resilience:** Reduced import dependency through domestic production and diversified sources enhances India's strategic autonomy.
- **Green Development Goals:** Biofuels, green hydrogen, and CBG (Compressed Biogas) integration support India's net-zero and energy transition commitments.
- **Consumer-Centric Model:** Subsidies, stable pricing, and wide LPG access prioritize affordability without compromising infrastructure upgrades.

Steps Taken by Government in Enhancing Energy Strategy

- **Exploration and Production Push:** Doubling of exploration acreage (8% to 16%) with the goal of covering 1 million sq. km by 2030.
    - Reform-driven expansion via Open Acreage Licensing Policy (OALP), reduced 'No-Go' areas by 99%.
    - Pricing incentives and infrastructure sharing under new revenue-sharing models.
- **Technology-Backed Discoveries:** Over 25 new hydrocarbon discoveries by ONGC and Oil India across multiple basins.
    - Use of seismic surveys, AGG, and Mission Anveshan to map frontier areas like the Andamans and Cauvery.
- **Downstream and Retail Expansion:** 24,000 km product pipelines, 96,000+ fuel retail outlets.
    - City gas coverage increased to 307 areas; PNG and CNG networks scaled up.
- **Green Energy Integration:** Ethanol blending reached 19.7% (2025); CBG under Sustainable Alternative Towards Affordable Transportation (SATAT) with over 100 plants; ₹1.26 lakh crore in forex savings.
    - Massive push for green hydrogen—8.62 lakh tonnes of tenders awarded, with major PSU-led projects underway.
- **Policy and Infrastructure Reforms:** Oilfields Act 2024 enables hybrid leases for hydrocarbon-renewable synergy.
    - PM Gati Shakti mapped over 1 lakh assets; aided projects like Indo-Nepal pipeline and Samruddhi Corridor.

Source: The Hindu: A strategy fuelled by vision, powered by energy

Mustard Oil, GM Crops, and Public Health

Context

Two recent decisions — FSSAI's 2021 ban on blended mustard oil and the Supreme Court's 2024 ruling against GM mustard — aim to protect public health, but raise complex trade-offs.

Facts

- Mustard oil (rapeseed-mustard oil) is the 3rd-largest edible oil consumed in India.
- It is a dietary staple, especially in northern and eastern regions.

Key Issues in Mustard Oil Policy

- **High Erucic Acid Content in Mustard Oil:** Indian mustard oil contains 40–54% erucic acid vs. global norm of <5%.
  - High levels are linked to cardiac and organ-related issues in lab animals.
  - Globally, low-erucic alternatives like canola are preferred.
- **FSSAI Ban on Blended Mustard Oil (2021):** Aimed at reducing adulteration and boosting mustard farming.
  - However, blending reduces erucic acid and improves lipid profile (↑ HDL, ↓ LDL).
  - The ban affects consumer health options and affordability.

HDL (High-Density Lipoprotein) – "Good" Cholesterol

- HDL is known as the "good" cholesterol.
- Its main function is to absorb cholesterol from the blood and carry it back to the liver, where it can be broken down and removed from the body.
- Higher levels of HDL are associated with a lower risk of heart disease and stroke because HDL helps clear excess cholesterol from the arteries, preventing plaque buildup.
- HDL also has anti-inflammatory and antioxidant properties, further protecting blood vessels.

LDL (Low-Density Lipoprotein) – "Bad" Cholesterol

- LDL is referred to as the "bad" cholesterol.
- It transports cholesterol from the liver to the cells, but when present in excess, LDL can deposit cholesterol on artery walls, leading to the formation of plaque.
- This buildup narrows and hardens arteries (atherosclerosis), increasing the risk of heart attack, stroke, and other cardiovascular diseases.
- High levels of LDL are a major risk factor for coronary artery disease.

- **Supreme Court Ruling Against GM Mustard (2024):** GM crop DMH-11 has lower erucic acid (30–35%) and higher yield.
  - Court cited insufficient health impact assessments.
  - Denial may prolong reliance on high-erucic, traditional mustard.
- **Public Health vs. Food Safety:** Adulteration concerns are valid — FSSAI found 24% oils failed quality checks.
  - But a blanket ban reduces healthier blending options instead of improving regulation.
- **Economic Angle:** India imports $20.56 billion worth of edible oils annually.
  - GM mustard could reduce this by enabling domestic production of low-erucic oil.
  - Current policy may perpetuate high import dependency.

Policy Gaps and Recommendations

- Both the FSSAI ban and the Supreme Court's cautious approach to GM mustard were motivated by public health concerns.

- However, neither policy fully addresses the core problem: the high erucic acid content of Indian mustard oil.
- **International Context:** Canada and Europe have developed rapeseed cultivars with <2% erucic acid through breeding programs.
    - India's plant breeding efforts should prioritize achieving similar low-erucic acid traits.
- **Effective solutions require:** Promoting low-erucic acid mustard varieties (through GM or conventional breeding).
    - Allowing safe, regulated blending with clear labeling and strong enforcement to prevent adulteration.
    - Prioritizing research and development to bring Indian mustard oil in line with international health standards.

Source: The Hindu: A ban, a split verdict, and a health concern

The Great Churn in Asia

Context

Asia's geopolitical landscape is undergoing rapid transformation driven by US-China tensions, strategic realignments, and domestic political shifts, compelling India to recalibrate its foreign policy with enhanced autonomy and flexibility.

The Geopolitical Churn in Asia: Causes and Contours

- **Causes**: Key drivers include:
  - The **US-China rivalry**—spanning trade, tech, and military dominance.
  - **Shifting domestic politics** in Asian nations like South Korea, the Philippines, and Taiwan.
    - **Example**: In South Korea the **likely election of Lee Jae-myung**, a progressive leader, signals a **pivot from conservative foreign policy** under Yoon Suk Yeol.
  - The emergence of **strategic autonomy** among mid-sized powers (e.g., India, France, South Korea).
  - **Economic de-risking**, realignment of supply chains, and energy security concerns.
- **Contours**: The visible **shapes or outlines** of this churn, such as:
  - **Evolving security architecture** in the Indo-Pacific (e.g., Quad, AUKUS).
  - **Tensions in Taiwan Strait, South China Sea, and Korean Peninsula**.
  - **New coalitions and regional alignments**, often bypassing traditional Cold War-era blocs.

Implications of the Asian Churn

Dimension	Trends & Consequences
Security Architecture	Dilution of traditional alliances; regional defence groupings like AUKUS, Quad, and trilateral US-Japan-Korea emerging.
Economic Order	Shift from globalization to **'de-risking'** supply chains; Indo-Pacific Economic Framework (IPEF) vs. RCEP.
Diplomatic Alignments	Strategic autonomy gaining favour; multialignment replacing non-alignment.
Technological Race	Chip wars, AI regulations, semiconductors becoming core national security interests.

India's Path Amidst the Churn

- **Embrace Strategic Autonomy 2.0:** India must avoid binary alignments — neither bandwagon with the US nor appease China.
  - Adopt a **multi-vector approach**: strong US, EU ties, but engage Russia, ASEAN, and Global South.
- **Strengthen National Capabilities:**
  - **Economic Security:** Boost domestic manufacturing, especially in semiconductors, clean energy, and defence.
  - **Military Modernisation:** Enhance naval and air capabilities to deter coercion in the Indo-Pacific.
- **Deepen Regional Partnerships:**
  - **Act East 2.0:** Expand ties with ASEAN, Japan, Australia, and South Korea — not just diplomatically but through trade and infrastructure.
  - **Quad+ Initiatives:** Leverage Quad on tech, climate, health, and maritime security.
- **Reclaim Leadership in Global South:** Lead consensus-building forums like the **BRICS, Indian Ocean Rim Association (IORA), India Brazil South Africa (IBSA) forum**, and **Global South Summits** to shape rules on trade, AI, and climate justice.

- **Maintain Flexibility in a Fragmented Order:** Prepare for a **multiplex world**, not bipolar — with overlapping networks of cooperation and contestation.
    - India must retain room to manoeuvre on emerging issues like AI ethics, internet governance, supply chain resiliency, and green transitions.

Source: **Indian Express: The Great Churn in Asia**