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WEEKLY



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- ▣ INDIA-CROATIA RELATIONS
- ▣ INDIA-CYPRUS STRATEGIC PARTNERSHIP
- ▣ INDIA-CANADA DIPLOMATIC RESET
- ▣ NUCLEAR NON-PROLIFERATION TREATY (NPT)
- ▣ INDIA'S NUCLEAR LIABILITY REGIME
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- ▣ Strait of Hormuz

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- ▣ SEZ Rule Relaxation
- ▣ India's Trade Deficit Narrows

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- ▣ Regulation of AC Temperature Range
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- ▣ Aralam Wildlife Sanctuary
- ▣ Flue Gas Desulphurisation (FGD)

SCIENCE & TECHNOLOGY

- ▣ Breath and Human Health
- ▣ Hydraulic Systems

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The current affairs articles are segregated from prelims and mains perspective, such separation is maintained in terms of structure of articles. Mains articles have more focus on analysis and prelims articles have more focus on facts.

However, this doesn't mean that Mains articles don't cover facts and PT articles can't have analysis. You are suggested to read all of them for all stages of examination.

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SECTION -A

MAINS ISSUES

GLOBAL GENDER GAP INDEX

Context:

India has ranked 131 out of 148 countries in the World Economic Forum's Global Gender Gap Report 2025, slipping two places from its position last year. With a parity score of just 64.1%, India is among the lowest-ranked countries in South Asia,

Global Gender Gap Index (GGGI)

- **Published by:** World Economic Forum (WEF) annually.
- **Purpose:** Measures gender-based disparities across countries and tracks their progress.
- **Four Core Dimensions:**
 - Economic Participation and Opportunity
 - Educational Attainment
 - Health and Survival
 - Political Empowerment
- **Scoring Range:** 0 (complete inequality) to 1 (complete equality).

India's Overall Ranking and Score (2025)

- **Global Rank:** 131 out of 148 countries (↓ 2 ranks from 129 in 2024).
- **Overall Score:** 64.1% parity.
- **Regional Context:**
 - India is one of the lowest ranked in South Asia.
 - Ranked below: Bhutan (119), Nepal (125), Sri Lanka (130).
 - Ranked above: Maldives (138), Pakistan (148).

India's Performance by Dimension

■ Economic Participation and Opportunity

- **Score:** 40.7% (↑ 0.9 percentage points from 2024).
- **Labour Force Participation:** Static at 45.9%.
- **Estimated Earned Income Parity:** 29.9% (↑ from 28.6%).
- **Observation:** Improvement noted, but income gaps remain significant.

■ Educational Attainment

- **Score:** 97.1% – near parity.
- **Reasons:** Higher literacy and tertiary enrolment among females.
- **Concern:** Education gains not translating into economic/leadership roles.

■ Health and Survival

- **Improvement:** Parity in sex ratio at birth and healthy life expectancy.
- **Caveat:** Overall life expectancy declined → parity is relative, not absolute.

■ Political Empowerment

- **Parliamentary Representation:** ↓ to 13.8% (from 14.7% in 2024).
- **Ministerial Roles:** ↓ to 5.6% (from 6.5%).
- **Trend:** Second year of decline, far from 30% peak in 2019.

Global Trends and Key Observations

■ Top 5 Countries:

- Iceland (1st for 16th consecutive year)
- Finland
- Norway
- United Kingdom
- New Zealand
- **Global Gender Parity Score (2025):** 68.8% – Best post-pandemic improvement.
- **Estimation:** At the current pace, full global parity is 123 years away.
- **Leadership Disparity:** Women = 41.2% of workforce, but only 28.8% of leadership roles.

Implications for India

■ Economic Impact:

- Gender parity contributes to inclusive and resilient economic growth.
- WEF reiterates that closing gender gaps boosts GDP, innovation, and governance.

■ Policy Challenges:

- Stagnation in economic participation despite education parity.
- Decline in political representation indicates institutional and cultural barriers.
- Need for stronger gender-responsive policymaking, especially in labour, leadership, and political domains.

INDIA AT THE G7 SUMMIT 2025 (KANANASKIS, CANADA)

Context

Prime Minister Narendra Modi participated in the **51st G7 Summit Outreach** Session held in **Kananaskis, Canada** during his three-nation tour (**Cyprus, Canada, Croatia**). This marked his 6th consecutive appearance at the G7 as an invitee, reflecting India's growing global clout and its voice for the Global South.

What is the G7?

- Group of Seven (G7) is an informal forum of the world's seven most advanced economies—U.S., UK, Germany, France, Italy, Japan, Canada—plus the EU (as observer).
- It was formed in 1975 to address the global oil crisis; Canada joined in 1976.
- Temporarily became G8 with Russia (1998–2014); reverted to G7 post-Crimea crisis.
- Covers global issues like economic growth, energy, security, AI, climate, trade, health, etc.
- Rotating presidency decides agenda; decisions are non-binding but influential.

2025 G7 Theme (Canada Presidency)

- The 2025 G7 Summit was centered on three pillars:
 - Protecting communities worldwide (health, security, humanitarian concerns)
 - Energy security & digital transition
 - Forging future partnerships (tech, resilience, development)
- **India's Participation:** PM Modi addressed the session on Energy Security, emphasizing:
 - Diversification, technology, and infrastructure
 - India's commitment to affordable, sustainable and reliable energy
 - India's role in representing the Global South's concerns
- India reiterated its G20 legacy and willingness to carry forward global reforms through G7 collaboration.

India's Broader Significance at the G7

- India is not a formal member, but a regular invitee since 2003 (more than 11 times).
- The visit highlights India's:
 - 5th-largest economy
 - Largest democracy
 - Voice of the Global South
- It is seen as a bridge between advanced economies and the developing world on issues like:
 - Climate action
 - Supply chain resilience
 - Multilateralism and reform

INDIA-CROATIA RELATIONS

Context:

Prime Minister Modi's visit to Croatia marks the first official visit by an Indian Prime Minister to the country since diplomatic ties were established in 1992. This historic outreach underlines Croatia's growing strategic, economic, and cultural relevance in India's evolving European policy.

India-Croatia Relations (Brief Background)

- **Croatia was part of Yugoslavia** until it declared independence in 1991. India **recognized Croatia's independence in 1992** and established full diplomatic ties the same year.
- Historical links date back to the **Non-Aligned Movement** era, when Yugoslav leader **Tito** (of **Croat-Slovene origin**) shared close ties with India.
- During the Yugoslavia days, **over two-thirds of Indo-Yugoslav trade** passed through what is now Croatia.



Map 01

■ Cultural Link:

- Croatian missionary **Filip Vezdin (Ivan Vezdin)**, in 1790, wrote the **first printed Sanskrit grammar** (in Latin), based on his interactions with **Kerala Brahmins**.
- Croatia has contributed to **Goan architecture**, such as the Church of São Brás.

Why Croatia Matters Today?

- **Geographic Advantage:** Croatia lies on the Adriatic Sea and has major ports like **Rijeka, Split, and Ploče**. These ports are connected to the **Trans-European Transport Network (TEN-T)**.
 - Croatia is part of the **Three Seas Initiative (3SI)** — a grouping of 12 EU countries between the **Adriatic,**

Baltic, and Black Seas.

- **India–Middle East–Europe Economic Corridor (IMEC):** Croatia could be a key link in IMEC, India's alternative to China's Belt and Road Initiative (BRI). Connecting via Croatia gives India better access to Central and Eastern Europe, bypassing over-reliance on Western Europe.
- **Trade and Investment:** Bilateral trade is growing from USD 199 million in 2017 to USD 337 million in 2023.
 - **India exports:** Pharmaceuticals, machinery, textiles, consumer goods.
 - **Croatia exports:** Chemicals, precision instruments, timber, rubber, and oils.
- **China Factor:** China has invested significantly in the Balkans under BRI. India's deeper engagement is aimed at countering Chinese influence in the CEE region.

INDIA-CYPRUS STRATEGIC PARTNERSHIP

Context

Prime Minister Narendra Modi visited Cyprus as part of a three-nation tour (Cyprus-Canada-Croatia). This was the first Indian PM visit to Cyprus in 23 years, highlighting renewed strategic interest.

Key Outcomes of the Visit

Defence and Security Cooperation

- ▶ India and Cyprus will expand maritime cooperation, including more frequent Indian Navy visits to Cypriot ports.
- ▶ **Search and Rescue (SAR) Training:** Joint exercises in maritime safety, critical in the Suez-to-Europe shipping route.
- ▶ **Terrorism Information-Sharing:** A formal mechanism to exchange intelligence and combat terror threats.
- ▶ **Cybersecurity and Maritime Security:** Though details are not public, both sides agreed to deepen cooperation in these domains.

Cyprus and the IMEC Puzzle

- ▶ Cyprus joins India's IMEC plans — a transcontinental infrastructure corridor connecting India to Middle East to Europe.
- ▶ Cyprus's location near the **Suez Canal** and deep-water ports (**Limassol and Larnaca**) are ideal for:
 - ◆ Cargo transshipment
 - ◆ Maritime connectivity
 - ◆ Port-to-port logistics between Gulf and European nodes of IMEC
- ▶ Natural gas reserves off Cyprus help India's energy diversification efforts and Europe's efforts to reduce dependence on Russian gas.

- ◉ **India-Greece-Cyprus Business and Investment Council (IGC) launched** to promote trade, renewable energy, civil aviation, digital payments, and more.

Cyprus affirmed strong political support to India:

- ▶ Backed India's UNSC permanent membership
- ▶ Supported the India-US Civil Nuclear Deal
- ▶ Condemned terrorism in Kashmir, showing clear support for India

Significance of Cyprus

- ◉ Turkey is increasingly aligned with Pakistan, supports its stance on Kashmir, and has been hostile to India's interests at global forums.
- ◉ Turkey opposed India's stance after the April 2025 Pahalgam terror attack, siding with Pakistan.

- ◉ Turkey also dismissed IMEC, arguing no trade corridor can bypass it.
- ◉ By involving Cyprus (a rival to Turkey) in IMEC, India is:
 - ▶ Challenging Turkey's claim as the only viable gateway for East-West trade.
 - ▶ Affirming Cyprus's sovereignty, especially when parts of Cyprus are under Turkish occupation since 1974.
 - ▶ Sending a clear message of counterbalancing Turkey's role in the Eastern Mediterranean.
- ◉ India's outreach also complements ties with Turkey's other regional rivals:
 - ▶ Greece
 - ▶ Armenia
 - ▶ Egypt

This reflects a regional balancing strategy by India against the growing China-Pakistan-Turkey axis.

IMEC vs. BRI:

Feature	IMEC (India's Project)	BRI (China's Project)
Launched	G20 Summit 2023	2013
Partners	India, UAE, Saudi Arabia, EU, USA, now Cyprus, possibly Greece	China and 150+ countries
Goal	Seamless cargo & digital connectivity from India to Europe via Gulf	Infrastructure diplomacy, global supply chains
Status	Early-stage but gaining traction	Facing debt trap criticism, slowing momentum
Geopolitical Aim	Rules-based, democratic alternative to BRI	Influence over developing economies

INDIA-CANADA DIPLOMATIC RESET

Context:

India and Canada have agreed to **resume diplomatic engagement** by restoring the presence of high commissioners in each other's capitals following a bilateral meeting between the Indian Prime Minister and Canadian Prime Minister Mark Carney on the sidelines of the **G7 Summit in Alberta**.

India–Canada Relations (Brief Background)

- **Diplomatic ties since 1947**; both are **democratic, pluralistic Commonwealth nations**.
- The relations fluctuated due to **nuclear disagreements** (1974, 1998) and the **Khalistan issue**.
- India recognized as a priority in Canada's **Indo-Pacific Strategy (2022)**.
- **Recent tension (2023)** over Hardeep Singh Nijjar's killing led to diplomatic downgrades.
- **However, this 2025 G7 meeting** marked a **reset**, with agreement to restore High Commissioners and resume sectoral talks.

Why is this meeting important?

- **Restoration of Diplomatic Channels**: Both sides agreed to restore full diplomatic representation by appointing new High Commissioners in Ottawa and New Delhi. This is the first concrete step toward normalising ties after over a year of suspended formal engagement.
- **Revival of Sectoral Dialogues**: The leaders agreed to resume institutional-level discussions across:
 - Trade and investment
 - Clean energy and critical minerals
 - Space cooperation and digital infrastructure
 - Technology and AI collaboration
- **Emphasis on Shared Values**: Both sides reaffirmed their commitment to: Democracy, Rule of law, Sovereignty and territorial integrity. This was particularly important in light of previous concerns over foreign interference and Khalistan-related extremism in Canada.
- **Canada's Strategic Shift**: PM Carney's decision to invite India to the G7 summit indicates a strategic intent to reset ties. The new leadership in Canada is seen as being more pragmatic and India-friendly compared to the earlier Trudeau government.

Significance of Canada for India

- **Energy Security**: Canada is rich in **uranium, crude oil, LNG, and hydropower**—important for India's energy needs.
- **Critical Minerals**: Canada is a global supplier of rare earths, lithium, cobalt, essential for EVs and green tech.
- **Clean Technology**: Canada is a leader in clean energy, hydrogen, and climate technology, aligned with India's sustainability goals.
- **Education and Services**: Over 300,000 Indian students study in Canada; Indian IT and service firms operate in the Canadian market.
- **Diaspora Diplomacy**: The Indian diaspora is a key lever for soft power and economic linkages.
- **Indo-Pacific Strategy**: Canada's 2022 Indo-Pacific Strategy recognizes India as a key partner in ensuring a rules-based order.

- **Strategic Balance**: As a G7 and NATO member, Canada is part of the Western alliance system. Strengthening ties helps India diversify partnerships beyond the US and EU.

India-Canada Trade Relations (Current Status)

- **Goods trade (2024)**: USD 8.6 billion
 - India exports: USD 4.2 billion (e.g. pharmaceuticals, textiles)
 - Imports from Canada: USD 4.4 billion (e.g. fertilizers, wood pulp)
- **Services trade (2024)**: USD 14.3 billion
 - India's exports: USD 2.5 billion (mainly IT services)
 - India's imports: USD 11.8 billion (mainly education-related services)
- Canada is a **major source of potash and fertilizers**, which are crucial for Indian agriculture.
- Over **700 Canadian companies** operate in India, and Indian IT and pharmaceutical firms have a growing presence in Canada.

NUCLEAR NON-PROLIFERATION TREATY (NPT)

Context:

Amid escalating tensions with Israel and renewed IAEA censure, Iran has indicated its parliament is preparing a bill that may initiate the process of withdrawal from the Nuclear Non-Proliferation Treaty (NPT), raising significant legal and geopolitical implications for global nuclear governance.

Iran and the Nuclear Non-Proliferation Treaty (NPT): Legal, Geopolitical, and Strategic Dimensions

Understanding the NPT Framework

- **Purpose and Origins**:
 - ◆ Came into force in 1970; currently 191 parties.
 - ◆ Aims:
 - ◆ Prevent spread of nuclear weapons.
 - ◆ Promote peaceful nuclear energy.
 - ◆ Commit nuclear-weapon states to disarmament over time.
- **Key Provisions**:
 - ◆ Nuclear-armed states: U.S., U.K., Russia, China, France (pre-1967 detonations).
 - ◆ Article X: Allows withdrawal with a three-month notice citing "extraordinary events" threatening national interest.
 - ◆ Review conferences: Every five years (next in 2026).

■ Iran's Status and Compliance History

► NPT Signatory:

- ◆ Iran has been a non-nuclear-weapon state under NPT since 1970.
- ◆ Subject to IAEA safeguards for uranium enrichment programs.

► Key Disputes with IAEA:

- ◆ Breach of safeguards obligations, as per June 2024 IAEA Board resolution.
- ◆ Non-cooperation on undeclared nuclear sites and uranium traces.
- ◆ Iran accuses IAEA of politicization and lack of legal foundation.

► 2015 JCPOA Agreement (Iran Nuclear Deal):

- ◆ Negotiated with P5+1 (U.S., U.K., France, China, Russia + Germany).
- ◆ Iran agreed to restrictions on uranium enrichment in return for sanctions relief.
- ◆ U.S. exited in 2018 under President Trump, triggering Iranian escalation.

■ Geopolitical Trigger: Iran-Israel Escalation

- Israeli strikes on Iranian targets post-June 13 IAEA resolution.
- Iran retaliated with missile attacks, intensifying regional instability.
- Parliament considering exit from NPT as a countermeasure.

■ Implications of Iran's Possible Withdrawal from NPT

► For Global Non-Proliferation Norms:

- ◆ Weakens universality and credibility of NPT regime.
- ◆ Sets a precedent for other signatories dissatisfied with enforcement.

► For Regional Security (West Asia):

- ◆ Raises risks of a nuclear arms race in the Middle East.
- ◆ May intensify Israel's policy of nuclear ambiguity and preemptive strikes.

► For Global Diplomacy:

- ◆ Undermines current U.S.–Iran indirect talks on nuclear issues.
- ◆ Challenges IAEA's ability to ensure compliance.

■ Legal Dimensions of NPT Withdrawal

► Article X Provisions:

- ◆ Permits withdrawal citing national interest with 3-month prior notice.
- ◆ No punitive mechanism to prevent withdrawal; political responses may include UNSC action.

► Historical Precedent:

- ◆ North Korea withdrew in 2003, developed nuclear weapons after exit.

Way Forward

- ◉ **Diplomatic Re-engagement:** Revive negotiations on a renewed nuclear deal (post-JCPOA) involving IAEA oversight and phased sanctions relief.
- ◉ **Strengthening IAEA Safeguards:** Enhance verification capabilities and transparency mechanisms.
- ◉ **Regional Security Dialogue:** Promote a Middle East nuclear-weapons-free zone (MENWFZ) through multilateral frameworks.
- ◉ **Reinforce NPT Universality:** Address concerns of non-nuclear weapon states about imbalance in disarmament obligations.

Polity & Governance (GS-II)

INDIA'S NUCLEAR LIABILITY REGIME

Context:

Recent delays in foreign-assisted nuclear power projects such as the Jaitapur Nuclear Project and Kovvada Project have reignited debate over India's nuclear liability law, particularly provisions under the *Civil Liability for Nuclear Damage Act (CLNDA), 2010*, which impose supplier liability. This remains a major hurdle in operationalizing civil nuclear agreements with countries like France and the U.S.

India's Civil Nuclear Framework and International Liability Norms

- ◉ **Chernobyl (1986)** prompted global consensus on civil nuclear liability laws.
- ◉ **Convention on Supplementary Compensation for Nuclear Damage (CSC)** adopted in 1997 by IAEA to ensure uniformity and minimum compensation standards.
- ◉ CSC includes an **"escape clause"** for additional compensation from public funds if national funds fall short.

India's Domestic Framework: CLNDA, 2010

■ Objective and Scope

- Ensures *prompt compensation* to victims of nuclear accidents.
- Establishes *no-fault liability* for the nuclear operator.

■ Compensation Framework

- Operator's liability capped at ₹1,500 crore.
- Government liability capped at **300 million Special Drawing Rights (SDRs)** (~₹2,100–2,300 crore).
- Compensation must be covered through **insurance or other financial security**.

Section 17: Supplier Liability in Indian Law

- **Deviation from Global Norms**
- CSC allows supplier liability only if:
 - It's contractually agreed.
 - There is intent to cause damage.
- ▢ **India's Expansion (CLNDA Section 17(b))**
 - Allows right of recourse if damage arises due to:
 - ◆ Supply of defective equipment/material.
 - ◆ Patent or latent defects.
 - ◆ Sub-standard services by supplier or their employee.

Section 46: Additional Civil and Criminal Proceedings

- **Problematic Clause:** Does not prevent civil suits under tort or other laws.
- **Legal Ambiguity:** Suppliers may face *unlimited civil liability*, which goes beyond the cap defined under CLNDA.

Challenges in Implementation

- **Private Supplier Hesitancy:** Fears of unlimited liability deter foreign and domestic private firms.
- **Insurance Dilemma:** Lack of clarity on insurance cover requirements.
- **Delay in Key Projects:**
 - Jaitapur Nuclear Power Plant (France).
 - Kovvada Nuclear Project (USA).
- **Only Functional Foreign Reactor:** Kudankulam with Russian support—predates CLNDA.

Government's Position

- CLNDA is in line with CSC.
- Section 17(b) provides *optional*, not *mandatory*, recourse.
- Legal experts argue Section 17(a), (b), and (c) are independent and *supplier liability persists even without a contractual clause*.

RAJASTHAN'S CASH PLUS INITIATIVE

Context:

Rajasthan has successfully piloted and expanded a Cash Plus model that integrates conditional cash transfers (via PMMVY extension) with Social & Behaviour Change Communication (SBCC) across five tribal districts. This model aims to improve maternal and child nutrition and serve as a blueprint to achieve Sustainable Development Goals (SDGs)

Converging Cash Transfers with Behaviour Change for Nutrition and Gender Equity

▢ Rationale & SDG Alignment

- **Nutrition Crisis Focus:** India carries nearly one-third of global undernourished children; 18% low birth weight rate; one-fifth of children under five are wasted
- **Global SDG Relevance:** Undernutrition among mothers and infants negatively impacts SDGs 2 (Zero Hunger), 3 (Good Health), and 5 (Gender Equality).
- **Evidence Base:** Global studies show that cash + SBCC yields stronger outcomes than standalone interventions.

Implementation Framework

- **Expanded Eligibility:** Rajasthan's model includes second-time pregnant women, supplementing PMMVY's first-child focus
- **Conditional Cash Component:** Delivered through a unified registry and auto-enrolment, with disbursement tied to compliance during pregnancy and infancy
- **SBCC Strategy:** Multi-channel approach including interpersonal counselling, community mobilisation, mass media, digital messaging, and frontline worker job aids

Target Districts & Outreach

- **Pilot Districts:** Baran, Banswara, Dungarpur, Pratapgarh, Udaipur – all tribal and nutrition-vulnerable areas
- **Coverage & Scale:** Cash transfers reached ~200,000 second-time pregnant women; exposure to ≥4 SBCC platforms increased from 50% (2021) to over 90% (2024)
- **State-Wide Expansion:** Cash Plus has been scaled to all districts, serving as a viability template

Outcomes & Impact

▢ Improved Behavioural Metrics:

- Dietary diversity and weight gain during pregnancy
- Higher uptake of ANC, immunisation, and institutional delivery
- **Nutrition Outcomes:** Early breastfeeding saw a 49% increase; dietary diversity and counselling receptiveness both rose by ~50% .
- **Affordability Gains:** 80% of women reported better access to nutritious food attributable to increased income and awareness .

Challenges:

- Data integrity issues (maternal mortality under-reporting)
- Geographic inequities impacting tribal areas
- Overburdened community workers and training deficiencies

Recommended Measures:

- Strengthen digitised maternal-health records and mortality tracking
- Integrate Cash Plus with **POSHAN Abhiyaan, JSY, ICDS, RMNCH+A**
- Invest in SBCC capacity-building for Anganwadi and ASHA workers
- Encourage household and male involvement via targeted campaigns
- Systematic monitoring and third-party evaluations
- Replicate the model in other tribal/backward regions and low-income states

SCHEME RATIONALISATION

Context:

The Union Ministry of Finance mandated that all Central and Centrally Sponsored Schemes (CSSs) be subjected to third-party evaluation before seeking extension beyond March 31, 2026. This marks a significant shift towards performance-based governance, fiscal discipline, and evidence-based policymaking in India's public finance management.

Objectives of the Circular

- Ensure **efficient utilization of public funds**
- Encourage **accountability and transparency** in scheme implementation
- Link **budgetary allocation with performance outcomes**
- Rationalize schemes by **weeding out ineffective programs**
 - Introduce **financial limits** to prevent uncontrolled expansion of public expenditure

Key Provisions of the Circular

■ Sunset Clause

- Every scheme must have a **pre-defined end date**.
- Reappraisal required before continuation beyond 2026.

■ Evaluation-Based Continuation

- **Third-party evaluation** for Central Sector Schemes
 - ◆ **NITI Aayog appraisal** for CSSs
 - ◆ Continuation allowed only upon **positive outcome assessment**
- **Expenditure Cap**
 - ◆ Total projected outlay for the 16th Finance Commission cycle should not exceed **5.5 times** the average expenditure of 2021–2025.
- **Flexibility and Reallocation**
 - ◆ Ministries can **reallocate funds** from underperforming schemes to better-performing ones with justification.

➤ Fund-Limited Nature

- ◆ All schemes will operate within **pre-approved fund ceilings**.

◦ Impact on Demand-Driven Schemes (e.g., MGNREGS)

- Outlays will be linked to **projected beneficiary count** for the FC cycle.
- **Additional funding** needs special approval.

Opportunities and Challenges

Opportunities

- Promotes **outcome-driven governance**
- Aligns with **international best practices** (e.g., OECD's Results-Based Budgeting)
- Helps eliminate **redundant or overlapping schemes**
- Provides scope for **resource optimization**
- Improves **public trust** in welfare spending
- Encourages **inter-ministerial coordination**

Challenges

- **Quality of third-party evaluations** often suffers from lack of autonomy or technical expertise
- Risk of **premature termination** of schemes with long gestation impacts (e.g., education, nutrition)
- May affect **demand-responsive schemes** like MGNREGS during crises
- Adds **bureaucratic delays** to reapproval processes
- Absence of **real-time monitoring and feedback systems** in many schemes

Way Forward

- **Institutionalize Independent Evaluators:** Create a national agency for public scheme evaluation (under CAG/NITI Aayog).
- **Strengthen Monitoring Infrastructure:** Integrate **real-time dashboards, public data releases, and geo-tagging**.
- **Outcome Orientation from Inception:** Define **KPIs (Key Performance Indicators)** at the planning stage.
- **Protect Welfare Schemes:** Ensure schemes addressing **vulnerable groups** are not discontinued based solely on short-term outcome criteria.
- **Capacity Building:** Train government officials in **programme appraisal and cost-effectiveness analysis**.

UPSC PYQ

- Q:** Examine the role of NITI Aayog in promoting cooperative federalism and improving Centre-State coordination for effective implementation of development programs.

BORDER DEFENCE REBOOT

Context:

On June 15, 2025, India marks the **fifth anniversary of the Galwan Valley clash**, which led to the death of 20 Indian soldiers and redefined the trajectory of India-China relations. The event served as a watershed moment in India's defence preparedness, infrastructure development, and diplomatic engagement along the Line of Actual Control (LAC).

Background (The Galwan Clash Backdrop)

- In a major escalation along the Line of Control, Indian and Chinese troops clashed in the Galwan Valley on June 15, 2020.
- This incident was the first deadly confrontation in the region since 1975 and resulted in casualties on both sides.
 - The root cause is an **ill-defined, 3,440km (2,100-mile)-long disputed border**. Rivers, lakes and snowcaps along the frontier mean the line often shifts, bringing soldiers face to face at many points, sparking a confrontation.
- Border infrastructure developments and differing perceptions of the LAC had triggered the clash.
- Following the clash, both sides engaged in de-escalation talks amid heightened tensions in bilateral ties.
- The PLA's 2020 incursions had severely restricted Indian Army patrols at key points in the **Depsang Bulge and CNN Junction**.
- However, the establishment of buffer zones in areas like **Galwan, Khugrang, Gogra-Hot Springs, and Pangong Tso** helped reduce tensions.

India's Border Defence and Strategic Posture

▣ Rapid Military Repositioning

- High-altitude deployment of troops and acclimatized reserves across **Eastern Ladakh, Arunachal, and Sikkim**.
- Enhanced stockpiling of **extreme weather gear, winter rations, and armaments**.
- **Emergency Procurements**
- Utilised **fast-track procurement** of UAVs, surveillance systems, and light artillery under **Emergency Procurement Powers**.
- Enhanced **high-altitude medical support** and air evacuation systems.

Border Infrastructure Expansion

▣ Budgetary Commitment

- **Union Budget 2025–26**: ₹6.81 lakh crore allocated to defence (9.53% increase).
- **₹7,146 crore** to BRO for road and tunnel development.

Major Projects Executed

- Completion of **75 BRO projects worth ₹2,236 crore** in 2024.
- **Key assets**:
 - **Umling La**: Highest motorable road (19,024 ft)
 - **Nyoma Airfield** and **Shinku La tunnel** (strategic access to Zaskar)
 - Roads in **Ladakh, Arunachal, Sikkim, Himachal Pradesh**

Digital and Civic Integration of Border Areas

- Deployment of **4G telecom services** to remote villages like **Galwan and Demchok**, enabling:
 - Telemedicine and online education
 - Access to **PM-Gati Shakti and digital governance**
 - Boost to eco-tourism and digital entrepreneurship

Strategic Implications and Evolving Posture

- Galwan has **institutionalised distrust** of China within Indian military doctrine.
- India is adopting a **forward defence and permanent vigilance** model.
- Border management has transitioned from **reactive** to **proactive**, integrating **infrastructure, diplomacy, and technology**.

Strategic Analysis

- The **Galwan clash** permanently altered the **India-China strategic calculus**.
- India has adopted a **whole-of-government approach** combining military resilience, infrastructure development, and diplomatic engagement.
- Border villages are being **mainstreamed into national development priorities**, deterring territorial vacuum and external influence.

UPSC PYQ

Q: China's growing presence in the Indian Ocean Region is a cause of concern for India and regional stability. Discuss the implications and steps taken by India in this regard. (250 words) (2023)



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SECTION -B

QUICK BYTES

REOPENING SHIPKI LA PASS

Context:

The Himachal Pradesh government has reopened Shipki La Pass, located in Kinnaur district, for domestic tourism without requiring prior permits. This move, while not yet restoring commercial trade, holds cultural, historical, and strategic significance, and has revived hopes of cross-border trade with Tibet (China) and the reopening of traditional trans-Himalayan trade routes.

About

- Shipki La Pass is located at an altitude of 3,930 metres in Kinnaur district, Himachal Pradesh, on the India-China border (Tibet Autonomous Region).
- It is one of the three operational India-China border passes designated for trade:
 - Shipki La (Himachal Pradesh)
 - Nathu La (Sikkim)
 - Lipu Lekh (Uttarakhand)

Historical and Cultural Significance:

- Ancient Trade Route: In use since at least the 15th century, with oral traditions dating back even further.
- Bushahr–Guge Trade Nexus: The Kingdom of Bushahr (now Rampur) in India and Guge in Tibet were central to bilateral commerce.
- Folkloric Trade Oath: A poetic oath between communities symbolized trust and continuity of trade until recent geopolitical disruptions.

UPSC PYQ

Q: Consider the following pairs: (2014)

Pass

1. Nathu La
2. Zojila
3. Lipu Lekh
4. Rohtang

State

1. Sikkim
2. Himachal Pradesh
3. Uttarakhand
4. Jammu & Kashmir

Which of the above pairs is/are correctly matched?

- (a) 1 and 2 only (b) 1 and 3 only
(c) 2 and 4 only (d) 1, 3 and 4 only

STRAIT OF HORMUZ

Context:

Heightened tensions between **Iran and Israel–U.S.** have triggered renewed threats from Iran to **block the Strait of Hormuz**, a vital chokepoint through which approximately **20–21 million barrels of oil daily** pass (~20–25% of global seaborne oil)

About

- The **Strait of Hormuz** connects the **Persian Gulf** with the **Gulf of Oman** and **Arabian Sea**.
- It facilitates transit of 1/5 of global oil and 1/3 of LNG
Narrowest width ~21 nautical miles; shipping lanes just 3.2 km wide



- ▶ Even limited disruption could push crude prices above **\$100/barrel**, raising global inflation and impacting energy security
- ▶ Surge in **shipping insurance costs** and rerouting, as seen with tanker avoidance and convoy measures
- ▶ Initiatives like the **EMASoH coalition** and strategic reserves may partially stabilize markets

Iran's Strategic Constraints

- ▶ Severe economic self-harm: oil revenue constitutes ~65% of Iranian government earnings; blockade could destabilize its economy and internal stability.
- ▶ Regional tensions: Oman and GCC nations may oppose such moves, with US-led naval deployments ready to reopen closure

IAEA

Context:

The IAEA Board of Governors declared Iran in violation of its nuclear safeguards under the NPT for the first time since 2005, citing its failure to explain uranium traces at undeclared sites. The resolution, backed by 19 nations, may lead to Iran's referral to the UN Security Council

What is the IAEA Safeguards Agreement?

- The IAEA Safeguards Agreement is a legally binding arrangement between a non-nuclear-weapon state and the IAEA to verify compliance with the NPT.
- Under this, Iran is required to declare all nuclear activities and materials and allow full inspections.
- Non-compliance means violations of transparency, access, and declarations as stipulated under the agreement.

Background of Iran's Nuclear Controversy:

- The Joint Comprehensive Plan of Action (JCPOA) was signed in 2015 between Iran and P5+1 nations to limit Iran's nuclear programme.
- The U.S. withdrew from JCPOA in 2018, leading to increased Iranian uranium enrichment and reduced cooperation with the IAEA.

- The current resolution refers to undeclared nuclear material and sites that suggest past covert nuclear activities, especially until the early 2000s.

UPSC PYQ

Q: In India, why are some nuclear reactors kept under "IAEA safeguards" while others are not? (2020)

- Some use uranium and others use thorium
- Some use imported uranium and others use domestic supplies
- Some are operated by foreign enterprises and others are operated by domestic enterprises
- Some are State-owned and others are privately owned

Q: In the Indian context, what is the implication of ratifying the 'Additional Protocol' with the 'International Atomic Energy Agency (IAEA)'? (2018)

- The civilian nuclear reactors come under IAEA safeguards.
- The military nuclear installations come under the inspection of IAEA.
- The country will have the privilege to buy uranium from the Nuclear Suppliers Group (NSG).
- The country automatically becomes a member of the NSG.

OPERATION SINDHU

Context:

Amid escalating Iran-Israel conflict, the Government of India launched Operation Sindhu in April 2025 to evacuate Indian nationals from Israel. This came just a day after India evacuated citizens from Iran, indicating a dual-crisis situation in West Asia.

What is Operation Sindhu?

- Launched by: Ministry of External Affairs (MEA), Government of India
- Objective: To evacuate Indians from Israel who wished to return amidst conflict with Iran

Evacuation Plan:

- ▶ Indians are first moved to nearby safe land borders (likely to Jordan, Egypt, or Cyprus).
- ▶ From there, they are airlifted back to India.
- The operation involves transporting evacuees from Israeli cities like Tel Aviv, Haifa, and Jerusalem to nearby safe zones across land borders with Jordan (Amman/Aqaba) or Egypt (Taba/Cairo), and subsequently flying them back to India via entry points such as New Delhi, Mumbai, Kochi, or Ahmedabad.

- The operation's name "Sindhu" symbolically refers to India's ancient maritime and **civilizational identity**, often invoked during strategic evacuation or naval missions.

■ India's Past Evacuation Operations

- Operation Raahat (2015): Yemen
- Operation Ganga (2022): Ukraine
- Operation Kaveri (2023): Sudan
- Operation Devi Shakti (2021): Afghanistan



FACT BOX

About Sindhu

- "Sindhu" is the ancient Sanskrit name for the Indus River. The Sindhu (Indus) River originates in Tibet, flows through Ladakh, and continues into Pakistan, draining into the Arabian Sea.
- In Indian civilizational context, it represents the cradle of the Indus Valley Civilization.
 - The Indus Valley Civilization (c. 2600–1900 BCE), one of the world's oldest urban civilizations, developed around the Sindhu (Indus) River in present-day Pakistan and northwest India.

UN HIGH SEAS TREATY

Context:

The United Nations Oceans Conference (UNOC), held recently in France, marked a major step forward for global ocean governance. A total of 56 countries have now ratified the Biodiversity Beyond National Jurisdiction (BBNJ) Treaty, also known as the High Seas Treaty, bringing it closer to becoming legally binding. The treaty will enter into force once 60 ratifications are reached.

What is the BBNJ or High Seas Treaty?

- The BBNJ Treaty is a legally binding international agreement to regulate and protect biodiversity in the high seas, which make up nearly two-thirds of the ocean surface.
- It covers marine genetic resources, environmental impact assessments, equitable benefit-sharing, capacity building, and marine protected areas (MPAs) in areas beyond national control.

■ Status:

- 160 countries have signed it.
 - It requires 60 countries to ratify (align their national laws) for the treaty to become legally binding.
 - As of UNOC 2025, 56 countries have ratified it. India has not yet ratified but says it is "in process."

- Once 60 ratifications are complete, a 120-day countdown will start, after which the treaty will come into force. The first BBNJ COP (Conference of Parties) is expected in late 2026.

Key Challenges

- Benefit-sharing remains controversial:
 - Marine organisms like bacteria or deep-sea creatures have potential for biotechnology, medicine, and cosmetics.
 - But since these are found in areas beyond national control, it's unclear how commercial profits will be equitably shared, especially between developed and developing countries.
- No complete ban on extraction yet, which many environmental groups argue is essential to truly protect marine biodiversity.

Why is this Treaty important?

- The high seas are rich in biodiversity but are currently unregulated and overexploited.
- Activities like overfishing, deep-sea mining, and marine genetic extraction threaten long-term ocean health.
- The treaty aims to:
 - Establish marine protected areas in international waters.
 - Ensure equitable sharing of benefits from marine genetic resources.
 - Introduce mandatory environmental assessments for high-seas activities.
 - Support developing countries in technology, science, and capacity-building.
- The treaty complements the global goal of protecting 30% of marine and coastal areas by 2030 under the Convention on Biological Diversity and SDG-14 (Life Below Water).

UPSC PYQ

Q: With reference to the 'United Nations Convention on the Law of the Sea', consider the following statements:

- (1) A coastal state has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles.
- (2) Ships of all states, whether coastal or land-locked, enjoy the right of innocent passage through the territorial sea.
- (3) The Exclusive Economic Zone shall not extend beyond 200 nautical miles from the baselines.

Which of the statements given above are correct?

- (a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

PERFORMANCE GRADING INDEX

Context:

The Ministry of Education has released the Performance Grading Index for Districts (PGI-D) 2023–24, evaluating the performance of school education across India. Chandigarh, Punjab, Delhi, Kerala, Gujarat, Odisha, and others emerged as top performers, while Meghalaya was ranked lowest.

Key-findings of the Index

- **Top Performing States/UTs:** Chandigarh, Punjab, Delhi, Kerala, Gujarat, Odisha, Haryana, Goa, Daman & Diu, Maharashtra, Rajasthan
- **Bottom Performer:** Meghalaya
- **Average Performers:** Puducherry, Tamil Nadu, Karnataka, Himachal Pradesh, West Bengal, Andaman & Nicobar Islands
- Performance Gap reduced from 51% in 2017–18 to 41% in 2023–24
- Highest Grade Achieved: Prachesta–1; No state/UT has reached top grades like Daksh, Utkarsh, Atti-Uttam, or Uttam



FACT BOX

Performance Grading Index for Districts (PGI-D)

- **Performance Grading Index for Districts (PGI-D)** is a comprehensive tool to measure the **relative performance of school education at the district level**.
- **Launched by:** Department of School Education & Literacy (DoSEL), Ministry of Education
- It is **based on 74 indicators** grouped under **6 broad categories** and **11 domains**, with a total weightage of **600 points**.
- Key Categories & Domains:
 - **Categories:** Outcomes, Effective Classroom Transactions, Infrastructure Facilities & Student Entitlements, School Safety & Child Protection, Digital Learning, Governance Process
 - **Domains include:** Learning Outcomes, Teacher Availability, Infrastructure, Student Entitlements, Digital Learning, etc.
- Grading Methodology: '**Utkarsh**' grade is awarded to districts scoring more than **90%** of the total points. The grades are scaled down by **10% bands** to classify subsequent levels.
- The index aims to **identify gaps** and **drive policy-based interventions** in school education.

Similar Education Indices in India

- PGI – Performance Grading Index (State-level)
- NAS – National Achievement Survey
- UDISE+ – Unified District Information System for Education Plus
- NIRF – National Institutional Ranking Framework
- NAAC & NBA Accreditation

CCI'S COTTON PROCUREMENT

Context:

The Cotton Corporation of India (CCI) has procured nearly 100 lakh bales of cotton at Minimum Support Price (MSP) in the 2024–25 cotton season, with disbursements amounting to approximately Rs 37,500 crore. Concurrently, cotton imports surged by over 130%, raising concerns about domestic pricing and the competitiveness of Indian cotton in international markets.

Current Developments in Cotton Sector:

■ Cotton Procurement (2024-25 Season):

- CCI procured **100 lakh bales** at MSP.
- Sold **35 lakh bales** to textile mills and traders.
- Operated **500+ procurement centres** since October 2024.
- Expenditure on MSP procurement: **₹37,500 crore**.
- **MSP for next season (2025-26)** hiked by **8%**, implying potentially higher procurement costs.

■ Import Trends:

- **133% increase** in import quantity in May 2025 vs May 2024.
- **131% increase in import value** in April–May 2025 vs same period in 2024.
- Reasons:
 - ◆ International cotton is **~8% cheaper** than Indian cotton.
 - ◆ **11% import duty** still leaves foreign cotton **1–2% cheaper**.
 - ◆ **Impact:** Reduced competitiveness of Indian textile mills in **global markets**.

About Cotton Corporation of India (CCI):

- **Establishment:** 1970, under the **Ministry of Textiles**.
- **Headquarters:** Navi Mumbai.
- **Mandate:** To protect the interests of **cotton farmers** by purchasing **kapas (raw cotton)** at MSP; ensure price stability and supply management.

Functions:

- MSP operations as per Government of India directives.
- Commercial operations in open market when prices are above MSP.
- Balancing demand-supply and quality assurance in the cotton trade.

POLAVARAM-BANAKACHERLA LIFT PROJECT

Context:

Andhra Pradesh Water Resources Minister Nimmala Ramanaidu has defended the Polavaram-Banakacherla water diversion project, stating it will not affect the interests of upper riparian states (like Telangana).

What is the Polavaram-Banakacherla Project?

- It is a proposed inter-basin water transfer project by Andhra Pradesh to divert 200 TMC (thousand million cubic feet) of floodwater from the Godavari river (at Polavaram) to the drought-prone Rayalaseema region via Banakacherla.

Project Structure (in 3 Segments):

- Polavaram to Prakasam Barrage (on Krishna River).
- Prakasam Barrage to Bollapalli Reservoir (capacity: 173 TMC) via 6 lift irrigation systems.
- Bollapalli to Banakacherla through 3 more lifts and 2 tunnels.

Status:

- Preliminary Report submitted to the Central Water Commission (CWC) in May 2025.
- Awaiting Terms of Reference (ToR) clearance from the Ministry of Environment.
- Detailed Project Report (DPR) to be prepared after approvals.

OIL PRICE SURGE

Context:

Tensions between Israel and Iran in June 2025 have led to a spike in global oil prices, with Brent crude futures rising nearly 9% amid fears of potential disruption in oil supplies, especially through the Strait of Hormuz—a key global oil transit chokepoint. Concerns have intensified due to Iran's repeated threats to block this strategic waterway.

Why Do Geopolitical Conflicts Affect Oil Prices?

- West Asia (or the Middle East) is the largest oil-exporting region globally.

- Any military tension or war there raises fears of disruption in oil supplies, especially via maritime chokepoints.
- The biggest concern in this case is Iran's threat to close the Strait of Hormuz, a narrow but crucial sea route for global oil trade.

What is the Strait of Hormuz & Why Is It So Critical?

- It is a narrow waterway between Iran and Oman, connecting the Persian Gulf with the Gulf of Oman and the Arabian Sea.
- Roughly 1/5th of all globally traded crude oil (over 20 million barrels per day) passes through this chokepoint.
- Major oil-exporting countries like Saudi Arabia, Iraq, Iran, UAE, and Kuwait use it to ship oil to India, China, Europe, and the U.S.
- If Iran blocks or disrupts traffic here:
 - Oil tankers are delayed or rerouted.
 - Shipping and insurance costs rise.
 - Global supply uncertainty increases, pushing prices up.

How Is India Affected?

India imports **85% of its crude oil** and is **one of the biggest importers from West Asia**.

- Disruptions at Hormuz would directly impact Indian energy security.
- Rising prices can:
 - Increase India's import bill
 - Worsen the trade deficit
 - Fuel inflation (especially petrol, diesel, transport costs)
 - Strain government finances due to oil subsidies (e.g., on LPG)

How Is India Managing the Situation?

- India has diversified its crude import basket, including oil from Russia, the U.S., Latin America, and Africa.
- It is "comfortably placed" to manage current demand.
- Additionally:
 - India maintains Strategic Petroleum Reserves (SPR) to handle short-term supply shocks.
 - The government is also pushing green energy, ethanol blending, and domestic production to reduce import dependency.

SEZ RULE RELAXATION

Context:

The Government of India has recently relaxed Special Economic Zones (SEZ) rules to attract investment in domestic semiconductor and electronics manufacturing, a sector crucial for reducing import dependence and securing supply chains. This move complements the existing Semicon India Programme launched in 2022 with a financial outlay of ₹76,000 crore.

Semiconductors: Strategic Importance

- ◉ **Definition:** Semiconductors are materials with conductivity between conductors and insulators; they are the core components of **integrated circuits (ICs)** or microchips.
- ◉ **Applications:** Found in smartphones, computers, automobiles, defence systems, AI infrastructure, IoT devices, etc.
- ◉ **Strategic Resource:** Post-COVID-19, countries realized the **vulnerability** of global supply chains, especially with **China producing ~35% of the world's chips (2021)**.
- ◉ **National Security Link:** Disruption in chip supplies can impact defence, critical infrastructure, and strategic autonomy.

Relaxation in SEZ Rules

- ◉ **Previous Restriction:** SEZ units had to **export at least 51% of their output**, and **domestic tariff area (DTA) sales were taxed heavily**.
- ◉ **Recent Change:** Government has **eased DTA access** for SEZ-manufactured goods, allowing more flexible domestic sales without significant penalties or procedural bottlenecks.
- ◉ **Implication:** This is expected to **facilitate semiconductor fabs and electronics units** to sell in India's growing domestic market — a key concern of potential investors.

Semicon India Programme (2022)

- ◉ **Launched by:** Ministry of Electronics and Information Technology (MeitY)
- ◉ **Outlay:** ₹76,000 crore
- ◉ **Components:**
 - **Design Linked Incentive (DLI) Scheme**
 - **Modified Programme for Semiconductors and Display Fab Ecosystem**
 - **Incentives for compound semiconductors and ATMP/OSAT units**
 - **Objective:** To develop a **self-reliant semiconductor ecosystem** including design, manufacturing, packaging, and research.

Global Context

- ◉ Countries like the **U.S. (CHIPS and Science Act)** and **EU (European Chips Act)** have also adopted similar subsidy-based approaches to build **domestic semiconductor capabilities** and reduce dependence on China and Taiwan.

Special Economic Zones (SEZs):

Definition & Purpose

- ◉ **SEZ:** Designated duty-free zones within a country with liberal business and trade laws.
- ◉ **Aim:** To boost exports, attract investments, generate employment, and improve infrastructure.

Evolution of SEZs in India

- ◉ **1965:** Asia's first **Export Processing Zone (EPZ)** at Kandla, Gujarat.
- ◉ **2000:** SEZs introduced under **Foreign Trade Policy (FTP)**.
- ◉ **2005:** **SEZ Act** enacted.
- ◉ **2006:** SEZ Act & SEZ Rules came into force.
- ◉ Structured on the lines of **China's SEZ model**

SEZ Governance Structure

- ◉ **Board of Approval (BoA):** Apex body headed by **Secretary, Department of Commerce**.
- ◉ **Development Commissioners:** Appointed for administrative oversight at zone level.

Status

- ◉ **379 SEZs** notified; **265 operational**.
- ◉ **~64%** SEZs located in:
 - Tamil Nadu
 - Telangana
 - Karnataka
 - Andhra Pradesh
 - Maharashtra

Key Objectives of SEZ Act

- ◉ Promote **economic activity** and **exports**.
- ◉ Attract **foreign and domestic investment**.
- ◉ Generate **employment**.
- ◉ Develop **world-class infrastructure**.

Major Incentives and Facilities

- ◉ **Duty-free import/procurement** for SEZ units.
- ◉ **Tax exemptions:**
 - Income Tax (for initial years)
 - ◆ Minimum Alternate Tax (MAT) (phased out in some cases)
 - **External Commercial Borrowings (ECBs)** up to **\$500 million/year** without maturity restriction.
 - **Single-window clearance** for all central/state-level approvals.

Reform Initiatives

■ Baba Kalyani Committee (2018):

- ▶ Suggested **WTO-compatible** SEZ policy reform.
- ▶ Recommended integration with **global best practices**, infrastructure optimisation, and **employment-linked incentives**.

INDIA'S TRADE DEFICIT NARROWS

Context:

The Ministry of Commerce and Industry released monthly trade data showing a significant narrowing of India's trade deficit to USD 6.6 billion in May 2025, a nearly 30% reduction from May 2024. The improvement is primarily due to a fall in oil import bills and robust growth in services exports, especially in non-petroleum merchandise exports.

Key Trade Indicators – May 2025:

- **Total Exports:** USD 71.1 billion (↑ 2.8% YoY)
 - ▶ **Services Exports:** USD 32.4 billion (↑ 9.4%)
 - ▶ **Merchandise Exports:** USD 38.7 billion (↓ 2.2%)
 - ◆ **Non-petroleum Merchandise Exports:** ↑ 5.1%
- **Total Imports:** Contracted by 1% YoY
 - ▶ **Merchandise Imports:** ↓ 1.7%
 - ▶ **Non-petroleum Imports:** ↑ 10%
 - ▶ **Services Imports:** ↑ 1.5%
- **Trade Deficit (Overall):** USD 6.6 billion

■ Sectoral Performance

- ▶ Electronic goods exports, including mobile phones, recorded a sharp year-on-year growth of 54 percent.
- ▶ Chemical exports increased by 16 percent.
- ▶ Pharmaceutical exports grew by 7.38 percent.
- ▶ The decline in crude oil prices globally affected the value of total exports.

What is a Trade Deficit?

- A trade deficit occurs when the value of a country's imports exceeds the value of its exports. In simple terms, it means the country is buying more goods and services from other countries than it is selling to them.
- This results in a negative balance of trade, also known as a negative BOT (Balance of Trade).
- When money spent on imports is higher than the money earned from exports, a trade deficit is created.

- Trade deficits are an important indicator used to measure international trade activity. However, a trade deficit does not always mean a bad thing, as it depends on how the deficit is financed and the overall economic context.

Current Account Deficit (CAD):

- A trade deficit is a part of the current account deficit (CAD), which includes:
 - ▶ **Trade Account:** This measures the import and export of goods. A trade deficit occurs when a country imports more goods than it exports.
 - ▶ **Invisible Account:** This accounts for the export and import of services, income, and transfers. If services, such as IT or tourism, are being exported more than they are imported, it can offset a trade deficit.
- When the combined balance of both the trade and invisible accounts is negative, it leads to a current account deficit (CAD).
- A widening CAD indicates that more foreign currency (like USD) is being demanded to pay for imports, which can weaken the country's currency, such as the rupee.

REGULATION OF AC TEMPERATURE RANGE

Context

Given the sharp rise in electricity demand due to the growing use of air conditioners (ACs), the Indian government is planning to adopt new temperature standards for ACs — capping them between 20°C and 28°C, and default setting at 24°C. This move is being guided by the Bureau of Energy Efficiency (BEE) and is part of broader efforts to make cooling in India climate-sensitive and energy-efficient.

Rising Cooling Demand in India

- India currently has 10 crore (100 million) air conditioners, with 1.5 crore (15 million) units being added every year.
- Cooling (especially ACs) accounts for nearly 20% of India's peak power demand — around 50 GW.
- This is expected to increase rapidly with urbanisation, rising incomes, and hotter summers.

How Do Air Conditioners Work (Basic Concept)?

- ACs remove heat from indoor air and release it outside.
- This happens through a vapour-compression cycle using a refrigerant gas.

Main Components:

- **Evaporator:** Absorbs indoor heat and humidity.
- **Compressor:** Compresses the refrigerant gas; uses the most energy.

- Condenser: Releases the absorbed heat outdoors.
- Expansion valve: Regulates flow and pressure of refrigerant.

Why Temperature Standardisation is Needed

- Each 1°C increase in AC temperature can save 6% of electricity.
- Public buildings like airports, malls, and hotels often keep ACs at 18–21°C — this wastes energy and often causes discomfort, especially when people move between hot outdoors and cold interiors.

Comfort and Health Standards:

- WHO recommends minimum indoor temperatures above 18°C to avoid health risks like respiratory problems and poor cognitive function.
- Studies show temperatures up to 25°C can be comfortable when humidity and air flow are well managed.

Key Challenges

- Low Efficiency: Only 20% of ACs sold are 5-star rated. BEE's current energy rating system is lenient and will need revision by 2028.
- Poor Building Design:
 - India's Energy Conservation Building Code (ECBC) is not implemented seriously.
 - Passive cooling designs (like cross-ventilation, shaded windows, and insulated roofs) are underutilised.
- Consumer Behaviour:
 - Many people are unaware that setting ACs to lower temperatures increases costs and energy use.

India Cooling Action Plan (ICAP): A Long-Term Vision

Launched by the **Ministry of Environment, Forest and Climate Change (MoEF&CC)**, it is the **first national cooling policy** of its kind globally.

Key Goals by 2037-38:

- Reduce cooling demand by 20–25% across sectors.
- Reduce refrigerant demand by 25–30%.
- Cut energy used for cooling by 25–40%.
- Recognise "cooling" as a national R&D priority.
- Train 1 lakh technicians in efficient AC servicing, linked with Skill India Mission.

GREEN ARABIA HYPOTHESIS

Context:

A recent study published in *Nature* has revealed that the Arabian Desert—today one of the driest regions—witnessed

repeated humid (green) phases over the past 8 million years. This challenges the view of Arabia as an always-arid zone and has major implications for understanding past climate change and human migration.

Key Findings:

- Geographical Extent: The Arabian Desert spans ~900,000 sq mi, across Saudi Arabia, UAE, Oman, Yemen, and parts of Iraq, Jordan, etc.
- **Green Arabia Evidence:**
 - Speleothems (stalagmites) found in Arabian caves indicate periods of consistent rainfall and vegetation.
 - These formations can only form with soil and water, showing that Arabia had a much greener past.
- **Dating & Climate Data:**
 - Uranium dating helped determine the age of wet periods, forming a long climate record.
 - Oxygen isotopes confirmed multiple humid phases and past monsoon patterns.
- **Fossil Evidence:**
 - Fossils of hippos, giraffes, elephants, and primates were found in the UAE's Baynunah region (~7 million years old), showing the region once supported rich wildlife.
 - Arabia was a migration corridor between Africa and Eurasia.

Why it matters?

- It shows climate change is natural and cyclical over geological time.
- It supports theory of early human and animal migration through Arabia.
- It offers insights for climate models and desert greening efforts.

ARALAM WILDLIFE SANCTUARY

Context:

The Kerala State Forest Department has proposed to rename Aralam Wildlife Sanctuary in Kannur district as Aralam Butterfly Sanctuary, making it the first official butterfly sanctuary in Kerala. The proposal is under consideration by the State Board for Wildlife.

About Aralam Wildlife Sanctuary:

- **Location:** Kannur district, Kerala, in the Western Ghats.
- **Established:** 1984.
- **Area:** 55 square kilometers.
- **Forest Type:** Tropical and semi-evergreen forests.
- **Eco-Significance:** Known for high butterfly diversity and endemic species of the Western Ghats.

Butterfly Conservation Importance:

- **Butterfly Migration Events:** Annual migrations like the **Common Albatross Butterfly** draw significant ecological interest.
- **Collaborators:** Forest Department and **Malabar Natural History Society** have conducted surveys since 2000.
- **Key Event: Butterfly Migration Study** held annually (January–February) as a flagship ecological event.

Ecotourism and Biodiversity Role:

- Aralam is a hub for **ecotourism, butterfly watching, and nature-based studies**.
- This designation aligns with **India's larger goals of species-specific conservation and community-driven ecotourism**.
- It promotes awareness of insect biodiversity, critical for **pollination and ecosystem health**.

FLUE GAS DESULPHURISATION (FGD)

Context:

A high-level expert committee chaired by Principal Scientific Advisor Ajay Sood has recommended rolling back India's 2015 policy mandating the installation of Flue Gas Desulphurisation (FGD) units in all coal-fired thermal power plants (TPPs). This proposal comes in the wake of low compliance rates, financial concerns, and a recent Ministry of Environment notification deferring implementation deadlines.

What is Flue Gas Desulphurisation (FGD)?

- FGD is a pollution control technology designed to remove **Sulphur Dioxide (SO₂)** from flue gases emitted during the combustion of fossil fuels in thermal power plants.
- **Types of FGD technologies:**
 - *Dry Sorbent Injection:* Involves powdered limestone.
 - *Wet Limestone Scrubbing:* Forms gypsum, widely used.
 - *Seawater Scrubbing:* Used in coastal plants.

Why SO₂ Control is Necessary?

- SO₂ contributes significantly to **PM_{2.5} pollution** via secondary particulate formation.
- Major contributor to **respiratory diseases, acid rain, and climate change**.
- According to modelling studies, **15% of India's PM_{2.5}** is attributed to coal, and 80% of that is due to SO₂ emissions.

Status of FGD Implementation in India (As of April 2025)

- Mandate issued in 2015 to all 537 coal-fired TPPs.
- Original deadline was 2018; later revised to 2027-29.

- As of now, only **39 plants** have installed FGDs.
- New installations take **approximately two years**.

Economic and Policy Challenges

- Estimated cost: ₹1.2 crore per MW.
- Total estimated cost for planned capacity addition: ₹97,000 crore.
- Tariff impact: Around **₹0.72/kWh**, largely from fixed costs.
- Government cited **public health, affordability, and emissions balance** in evaluating the rollback.

Broader Environmental and Policy Linkages

- Links with **Air (Prevention and Control of Pollution) Act, 1981**.
- Compliance critical for India's **Paris Agreement NDCs** and air pollution reduction commitments.

UPSC PYQ

Q: Which of the following are the reasons for the formation of smog in urban areas? (2020)

- (4) Vehicle exhaust
- (5) Burning of crop residue
- (6) Construction activities
- (7) Flue gases from factories

Select the correct answer using the code below:

- (a) 1 and 4 only
- (b) 2 and 3 only
- (c) 1, 2 and 4 only
- (d) 1, 2, 3 and 4

BREATH & HUMAN HEALTH

Context

The COVID-19 pandemic changed how the world views airborne transmission. Initially, most public health agencies believed COVID-19 spread only via droplets that fell quickly to the ground. But new research proved that viruses can linger in the air and travel long distances via aerosols — turning attention to the science of breath and aerobiology (study of airborne life forms).

What is Aerobiology?

- Aerobiology is the study of biological particles in the air — including pollen, spores, viruses, and bacteria.
- During the pandemic, it became evident that many respiratory diseases — not just COVID-19 — can spread via airborne aerosols, not just direct contact or surface droplets.
- Historically, Louis Pasteur studied germs in the air, and during the Cold War, aerobiology was even used in developing bioweapons (e.g., anthrax and smallpox).

HYDRAULIC SYSTEMS

Context:

Mining operations, especially in dusty and high-load environments, heavily rely on hydraulic systems to power equipment like excavators, loaders, and drilling rigs. However, contamination of hydraulic oil is one of the leading causes of equipment failure, maintenance costs, and operational downtime.

Hydraulic systems remain the backbone of heavy machinery and automated industrial operations. Recent technological advancements have incorporated sensors and digital monitoring systems into hydraulics, enhancing efficiency, performance, and predictive maintenance.

What are Hydraulic Systems?

- A hydraulic system is a mechanical system that uses pressurized fluid (usually oil) to perform work — such as lifting, pushing, pulling, or rotating heavy objects.

How it Works

- ▶ Fluid is stored in a tank.
- ▶ A pump pushes this fluid through pipes under high pressure.
- ▶ This pressurized fluid moves into hydraulic cylinders or motors.
- ▶ The fluid's pressure creates force or movement, which powers machines like:
 - ♦ Excavators
 - ♦ Bulldozers
 - ♦ Forklifts

- ♦ Aircraft landing gear
- ♦ Braking systems

Where Are Hydraulic Systems Used?

- ▶ Construction: Cranes, excavators, bulldozers
- ▶ Automobiles: Braking systems (hydraulic brakes)
- ▶ Aerospace: Landing gear, flaps
- ▶ Industry: Hydraulic presses, injection moulding machines
- ▶ Agriculture: Tractors, harvesters

What's the Problem?

- Machines break down because of dirty oil.
- Even very tiny particles (smaller than dust and invisible to eyes) can damage the inside parts.
- This leads to:
 - ▶ Costly repairs
 - ▶ More machine failures
 - ▶ Delay in mining work

70% of failures in hydraulic systems are due to dirty oil.

What's the Solution?

Use of Advanced Filters by Donaldson. Their Alpha Web filters:

- ▶ Make oil 4 times cleaner
- ▶ Increase machine part life by up to 60%
- ▶ Help machines run longer without repairs

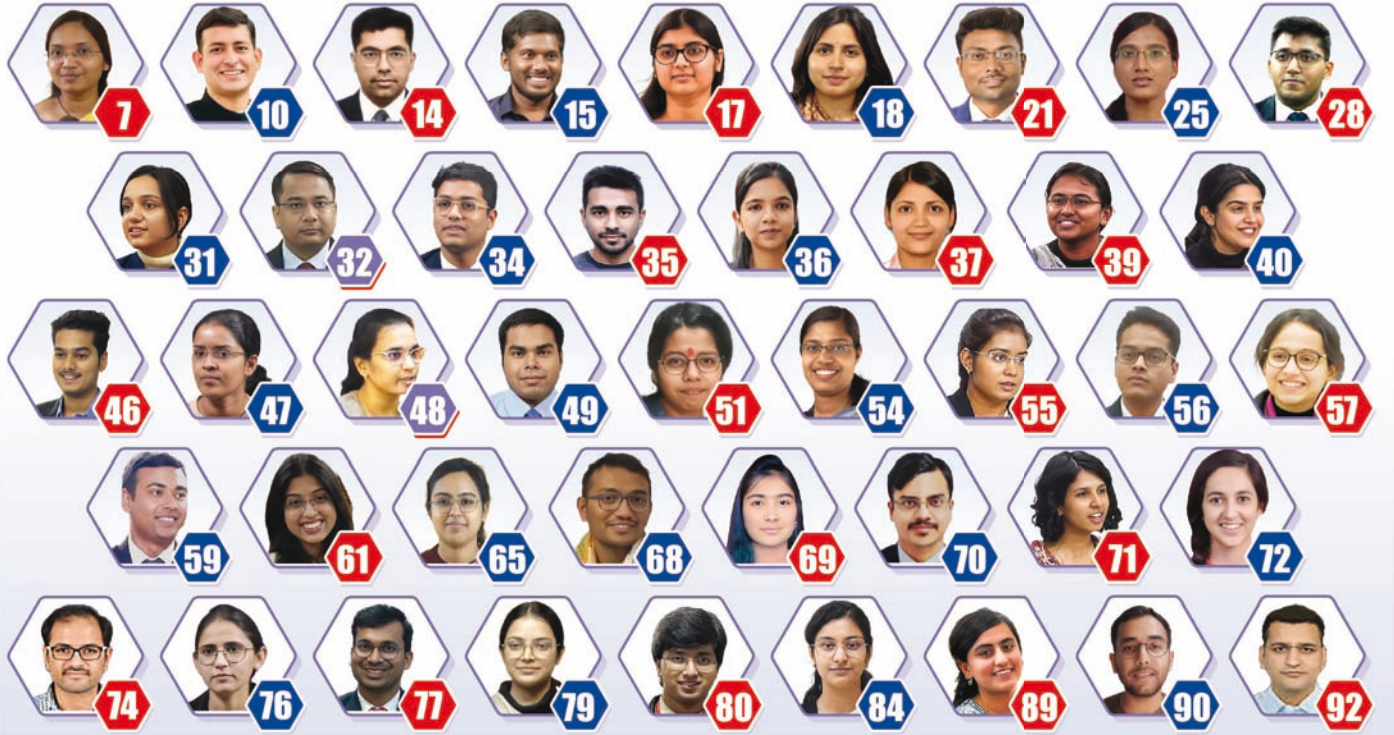


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