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IMPORTANT INSIGHTS

Global Gender Gap 2026: India Retains 131st Rank Despite Gains in Education and Health

Recent Developments:

- The **World Economic Forum (WEF)** released the **Global Gender Gap Report 2026** on 16 September 2026, marking the **20th edition** of the index, which has tracked gender parity since 2006 across 145 economies.
- India retained its **131st position** with an overall gender parity score of **64.5%**, improving by **4.3 percentage points since 2006**, although it remains below the global average of **69.2%**.
- India performs strongly in **Educational Attainment (96.6%)** and **Health and Survival (95.6%)**, but its **Economic Participation and Opportunity score remains only 41.2%**, indicating persistent structural barriers to women's economic participation.
- Globally, **69.2% of the gender gap has been closed**, but at the current rate of progress, complete parity is estimated to remain approximately **120 years away**. No economy achieved complete gender parity in 2026.

Understanding the Global Gender Gap Index:

Purpose and Methodology:

- The **Global Gender Gap Index (GGGI)** is an annual benchmarking framework developed by the **World Economic Forum in 2006** to measure the relative position of women and men across key socioeconomic and political dimensions.
- The index measures the **gap between women and men rather than the absolute level of development**, allowing economies with different income levels to be compared on gender parity.
- Scores range from **0 to 100**, with 100 representing complete parity; the index covers four dimensions: **Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment**.
- The 2026 edition covers **145 economies** and also uses a constant sample of 97 economies to examine long-term trends consistently across the 20-year period.

Four Dimensions of the Index:

- **Economic Participation and Opportunity:** Measures gender gaps in labour-force participation, estimated earned income, wage equality and representation in professional, managerial and senior positions.
- **Educational Attainment:** Measures parity in literacy and enrolment across primary, secondary and tertiary education.
- **Health and Survival:** Measures indicators including the sex ratio at birth and healthy life expectancy.
- **Political Empowerment:** Measures gender representation in parliament, ministerial positions and heads-of-state positions over the relevant historical period.

India's Performance in Global Gender Gap Report 2026:

Overall Gender Parity:

- India recorded an overall gender parity score of **64.5%**, placing it **131st among 145 economies**. Its score has improved by **4.3 percentage points since 2006**, with much of the long-term improvement concentrated in educational attainment.
- The score should be interpreted as the **share of the gender gap that has been closed**, rather than as a direct measure of women's overall socioeconomic status.

Economic Participation and Opportunity:

- India recorded a **41.2% parity score**, making economic participation one of its principal areas of gender disparity. The score improved by 0.5 percentage points over the previous edition but remains below India's 2013 level of 44.6%.
- Parity among **professional and technical workers** increased substantially from 26.6% in 2006 to **49.9% in 2026**, indicating significant progress in women's representation in skilled occupations.
- However, parity among **legislators, senior officials and managers** remains only **13.1%**, highlighting the continuing leadership gap.
- Labour-force participation parity has also improved only modestly over the long term, reaching **44.1% in 2026**.

Educational Attainment:

- India achieved a **96.6% parity score** in educational attainment, making education one of the country's strongest dimensions.
- India maintained **full parity in secondary and tertiary enrolment**, while primary enrolment also remained close to parity.
- Adult literacy parity stood at **82.5%**, although it declined slightly year-on-year; nevertheless, the indicator has improved substantially since 2006.
- The contrast between high educational parity and weaker economic participation indicates that **educational access alone does not automatically translate into equal labour-market outcomes**.

Health and Survival:

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- India recorded **95.6% parity** in health and survival, continuing the improvement observed in recent years.
- However, the **sex ratio at birth** remains weaker than its 2006 level, indicating that demographic gender discrimination continues to require policy attention.

Political Empowerment:

- Political Empowerment was India's **highest-ranked subindex**, with a parity score of **24.5%** and a global subindex rank of 67th.
- India's parliamentary parity score stood at **16.1%**, representing a 7-percentage-point improvement since 2006.
- At the ministerial level, parity stood at only **5.9%**, despite reaching 30% in 2019, demonstrating that gains in political representation have not been uniform across levels of decision-making.

Global Findings and Emerging Trends:

Global Gender Parity:

- The global gender gap reached **69.2% closed in 2026**, an improvement of 0.4 percentage points over the comparable previous-year cohort.
- **Iceland** retained the top position, followed by **Finland and Norway**, while **Chad** occupied the lowest position among the 145 economies covered.
- Despite two decades of gradual improvement, the WEF estimates that complete global parity remains around **120 years away** at the current pace.

Leadership and AI Gender Gap:

- Women accounted for only **19.1% of CEO positions globally**, illustrating the persistence of the leadership gap even where women's participation in professional occupations has increased.
- Women constitute **fewer than one in five AI engineers globally**, making gender representation in emerging technologies an important new frontier of gender equality.
- The emerging challenge is therefore shifting from merely ensuring access to education and employment towards ensuring women's representation in **high-value occupations, leadership positions, capital allocation and technology-intensive sectors**.

Major Challenges to Gender Parity in India:

Low and Unequal Labour-Market Participation:

- Women's participation in paid employment remains constrained by **care responsibilities, occupational segregation, social norms, safety concerns and limited access to suitable employment opportunities**.
- Recent official labour-force data also indicate a continuing rise in female labour-force participation, but participation levels and the quality of employment vary substantially between rural and urban areas.
- Policy therefore needs to distinguish between a numerical rise in labour-force participation and **sustained access to productive, formal and adequately remunerated employment**.

Unpaid Care Work and the Motherhood Penalty:

- Women continue to bear a disproportionate share of **unpaid domestic and care work**, which reduces their time available for paid employment, education and skill development.
- Career interruptions associated with childbirth and caregiving can reduce women's earnings, professional advancement and access to leadership positions.
- Expanding **childcare, eldercare, parental leave and basic household infrastructure** can therefore contribute directly to women's economic participation.

Safety, Mobility and Infrastructure:

- Concerns relating to **gender-based violence, inadequate public transport, poor street lighting and unsafe workplaces** can restrict women's mobility and narrow the geographical area within which they can pursue education or employment.
- Safe and reliable transport infrastructure should consequently be treated as an **economic-enablement measure**, not merely as a law-and-order intervention.

Digital and Technological Divide:

- Unequal access to **smartphones, internet connectivity, digital skills and emerging technologies** can exclude women from financial services, online education, digital entrepreneurship and technology-intensive employment.
- The growing importance of AI makes women's participation in **STEM education, AI engineering and technology leadership** increasingly important for future economic competitiveness.

Political Representation and Effective Agency:

- Formal representation does not automatically guarantee effective decision-making power.
- At the grassroots level, constitutional reservations have expanded women's representation in local government, but concerns about **proxy participation and patriarchal control** can weaken substantive political agency.
- Effective participation therefore requires leadership training, institutional support, financial autonomy and greater social acceptance of women in decision-making roles.

Intersectional Disadvantages:

- Gender inequality can be intensified by **caste, tribal status, poverty, disability, geographical isolation and other socioeconomic disadvantages**.
- A universal gender policy therefore needs to be complemented by targeted interventions for women facing multiple forms of exclusion, particularly in access to land, credit, skills, employment and public services.

Health, Nutrition and Reproductive Autonomy:

- **Anaemia, malnutrition, inadequate menstrual-health infrastructure and limited access to reproductive healthcare** can affect women's educational continuity, productivity and long-term economic participation.
- Improving nutrition and reproductive healthcare should therefore be integrated with education, employment and social-protection policies rather than treated as isolated welfare measures.

Government and Policy Measures:***Gender-Responsive Budgeting:***

- **Gender-Responsive Budgeting (GRB)** can connect public expenditure with measurable improvements in women's education, health, employment, safety and economic participation.
- The Union Budget 2026–27 continues to present a dedicated **Gender Budget Statement**, categorising provisions according to their expected benefit to women and girls.
- The policy priority should increasingly shift from merely reporting allocations towards **outcome-based monitoring**, including employment generated, women reached, assets created and improvements in service access.

Care Economy and Social Infrastructure:

- Investment in **crèches, childcare, eldercare, drinking water, sanitation and public transport** can reduce the unpaid-care burden and release women's time for productive activities.
- Such investment can simultaneously improve employment generation, human capital formation and women's labour-force participation.

Women's Economic Empowerment:

- Greater access to **formal credit, financial literacy, digital payments, entrepreneurship programmes, markets and property ownership** can strengthen women's economic autonomy.
- Schemes such as **Stand-Up India** can support women entrepreneurs by improving access to institutional credit for greenfield enterprises.

Education-to-Employment Transition:

- The policy focus needs to move from achieving enrolment parity towards ensuring **skill acquisition, employability, apprenticeships, career continuity and leadership opportunities**.
- Greater participation of women in **STEM, AI, manufacturing, digital services and high-productivity sectors** can help narrow the economic gender gap.

Political Empowerment:

- The **Nari Shakti Vandan Adhiniyam, 2023** provides a constitutional framework for reservation of seats for women in the Lok Sabha and State Legislative Assemblies, subject to the conditions specified in the constitutional amendments.
- Effective political empowerment also requires capacity building, access to political finance, leadership opportunities and institutional support so that representation translates into substantive participation.

Way Forward:***From Parity in Access to Parity in Outcomes:***

- India's high educational parity demonstrates that **access has improved considerably**, but the comparatively low economic and leadership scores show that the next challenge is converting educational gains into **employment, income, ownership and decision-making power**.
- Policy should therefore follow a lifecycle approach covering **education, skills, employment, childcare, health, finance, leadership and social security**.

Adopt the 3R Framework for Care Work:

- **Recognise** unpaid care work through better data and policy visibility, **Reduce** the burden through public infrastructure and affordable care services, and **Redistribute** responsibilities between households, employers and the state.
- Greater emphasis on shared parental responsibilities can also reduce incentives for employers to perceive women as disproportionately costly because of caregiving responsibilities.

Build a Gender-Responsive Digital Economy:

- Expand women's access to **devices, affordable internet, digital literacy, STEM education, AI skills and technology entrepreneurship**, particularly among rural and economically disadvantaged groups.
- Women's representation should be improved not only among technology users but also among **engineers, researchers, entrepreneurs and decision-makers**.

Strengthen Outcome-Based Governance:

- Gender programmes should be assessed through measurable indicators such as **female labour-force participation, wage and income parity, leadership representation, access to credit, safety, childcare availability and digital inclusion.**
- Convergence among ministries dealing with **women and child development, labour, education, skill development, health, finance and rural development** can reduce fragmentation.

UPSC Perspective:***Essay and Ethics:***

- Gender parity can be approached through **human capital, distributive justice, substantive equality, capability enhancement and inclusive development.**
- The central policy question is not merely whether women have access to institutions, but whether they possess the **capability, autonomy and agency to participate meaningfully** in economic, social and political life.

Value Addition for UPSC:***Key Data Points:***

- **India's GGGI 2026 Rank:** 131st out of 145.
- **India's Overall Gender Parity:** 64.5%.
- **India's Economic Participation and Opportunity:** 41.2%.
- **India's Educational Attainment:** 96.6%.
- **India's Health and Survival:** 95.6%.
- **India's Political Empowerment:** 24.5%.
- **Global Gender Gap Closed:** 69.2%.
- **Estimated Time to Global Parity:** Approximately 120 years.
- **Women among Global CEOs:** 19.1%.
- **Women among Global AI Engineers:** Fewer than one in five.

Constitutional and SDG Linkages:

- **Article 14:** Equality before law and equal protection of laws.
- **Article 15:** Prohibition of discrimination and scope for affirmative action.
- **Article 16:** Equality of opportunity in public employment.
- **Article 39(a):** Equal right to adequate means of livelihood.
- **Article 39(d):** Equal pay for equal work.
- **Article 42:** Just and humane conditions of work and maternity relief.
- **Article 51A(e):** Promotion of harmony and renunciation of practices derogatory to the dignity of women.
- **SDG 5:** Achieve gender equality and empower all women and girls.

Mains-Ready Conclusion:

- India's experience demonstrates that **gender parity is not achieved merely by expanding access to education or formal representation.**
- The persistence of economic, leadership, care and technology gaps shows the need to convert formal equality into substantive equality.

- A combination of **care infrastructure, safe mobility, quality employment, digital inclusion, financial empowerment, political agency and outcome-based gender budgeting** can enable women to contribute more fully to India's human capital and inclusive development.
- Closing the gender gap is therefore both a **social-justice imperative and a development strategy** for achieving the objectives of **Viksit Bharat 2047**.

India Electric Mobility Index 2025: Delhi Leads as States Accelerate Electric Mobility Transition Across India

Recent Developments:

- NITI Aayog released the **India Electric Mobility Index 2025** on **15 September 2026** in collaboration with **WRI India**, making it the second edition of the index after 2024.
- **Delhi** emerged as the top performer with a score of **84**, followed by **Maharashtra (78), Karnataka (73), Chandigarh (71) and Goa (65)**. These five jurisdictions were classified as **Top Performers**.
- The overall scores of the **36 States and Union Territories** ranged from 10 to 84, while the median score increased from **36 in 2024 to 40 in 2025**, indicating broad but uneven improvement.
- **Madhya Pradesh** recorded the most notable improvement in ranking, moving from **23rd to 7th position**, while Delhi increased its score from 77 to 84 and Maharashtra from 68 to 78.

About the India Electric Mobility Index:

Nature and Objectives:

- The **India Electric Mobility Index (IEMI)** is a composite index that evaluates both the **policy framework and implementation outcomes** for electric mobility across India's States and Union Territories.
- The 2025 edition assesses **28 States and 8 Union Territories** and tracks their progress towards an electric mobility transition during 2025.
- The index aims to **benchmark state performance, identify successful approaches, encourage healthy competition, facilitate peer learning and support evidence-based policymaking**.
- It strengthens both **competitive and cooperative federalism** by allowing States and Union Territories to compare their performance and adopt suitable practices from one another.

Structure of the Index:

- The IEMI evaluates **16 indicators** under three themes: **Transport Electrification Progress, Charging Infrastructure Readiness, and Electric Vehicle Research and Innovation Status**.
- **Transport Electrification Progress:** It carries the highest weight of **50%** and measures private and commercial EV adoption along with governance initiatives, purchase incentives, transition support, operational support and fuel-price parity.
- **Charging Infrastructure Readiness:** It carries **30%** weight and assesses charger availability, charging infrastructure subsidies and development initiatives, building regulations, renewable-energy capacity and power availability.
- **Electric Vehicle Research and Innovation Status:** It carries **20%** weight and covers **EV startups, research and development initiatives and patents**.

Key Findings of IEMI 2025:

Overall State Performance:

- **Delhi (84), Maharashtra (78), Karnataka (73), Chandigarh (71) and Goa (65)** were the five Top Performers nationally.
- Among the **Large States**, Maharashtra and Karnataka were the only Top Performers, while **Tamil Nadu (61), Madhya Pradesh (59), Odisha (55), Andhra Pradesh (52), Telangana (51), Haryana (51), Rajasthan (51) and Uttar Pradesh (51)** were classified as Frontrunners.
- The remaining Large States, namely **Chhattisgarh (49), West Bengal (42), Bihar (40), Kerala (40), Jharkhand (40), Punjab (39) and Gujarat (38)**, were classified as Emerging Performers.

Theme-Wise Performance:

- **Transport Electrification Progress** remained the weakest major dimension, with only **Delhi, Chandigarh and Maharashtra** reaching the Top Performer category; therefore, increasing actual EV adoption remains the largest opportunity for most States and Union Territories.
- **Charging Infrastructure Readiness** performed comparatively better, with **Karnataka scoring 97**, followed by **Goa (92) and Maharashtra (91)**, demonstrating that infrastructure development can advance faster than vehicle adoption.
- **Electric Vehicle Research and Innovation** showed wide variation across States and Union Territories, with **Delhi recording the highest score of 94**, reflecting its stronger ecosystem of startups, research activity and patents.

India's Electric Mobility Transition:

Growth in EV Adoption:

- India's EV penetration increased from only **0.5% in 2018 to 8.25% in 2025-26**, while more than **8.7 million EVs** were operating on Indian roads.
- Nearly **2.5 million EVs** were registered during 2025-26, representing an increase of approximately **25%** over the previous financial year, with two-wheelers accounting for the largest share.
- Electric commercial goods vehicles also recorded rapid growth, with penetration increasing from **0.6% in 2024 to 1.4% in 2025**.
- Public charging infrastructure expanded substantially, with around **29,000 public charging stations** reported by June 2025; however, charging availability remains uneven across States and regions.

Policy and Institutional Framework:

- By December 2025, **26 of 36 States and Union Territories** had active EV policies covering areas such as adoption, charging infrastructure, research, innovation and manufacturing.
- The IEMI highlights that the policy challenge is increasingly shifting from **policy formulation to implementation**, including charger deployment, regulatory enforcement, financial incentives, grid preparedness and ecosystem development.
- The **PM E-DRIVE Scheme** supports EV adoption through demand incentives and also provides **₹2,000 crore for public EV charging infrastructure** on a pan-India basis.
- The scheme has also been extended, with the overall PM E-DRIVE framework continuing until **31 March 2028**, alongside support for electric buses and domestic manufacturing.

Major Challenges:

Uneven Charging Infrastructure:

- Limited charging infrastructure remains a major barrier, particularly where settlements are dispersed and the economic viability of charging networks is weaker.
- The mismatch between **charging infrastructure readiness and actual EV adoption** shows that infrastructure availability alone does not guarantee rapid electrification.
- As of March 2026, the Government reported continued expansion of public charging infrastructure and reiterated the **₹2,000 crore PM E-DRIVE allocation** for public charging stations.

Regional and Institutional Disparities:

- E-mobility preparedness varies considerably between **metropolitan regions, industrialised States, remote areas and Hilly and Northeastern States**.
- The IEMI therefore introduced peer grouping into **Large States, Union Territories and City States, and Hilly and Northeastern States** to make comparisons more context-sensitive.

Innovation and Manufacturing Gaps:

- India's EV innovation ecosystem remains concentrated in a limited number of States, while many regions have relatively few startups, research initiatives and patents.
- Domestic manufacturing is expanding, but **battery-cell manufacturing and critical mineral security** remain important strategic concerns because electrification can otherwise shift import dependence from crude oil towards batteries and critical minerals.
- The Production-Linked Incentive framework for **Advanced Chemistry Cell battery storage and automobiles and auto components** is intended to strengthen domestic manufacturing and supply-chain resilience.

Significance of Electric Mobility:

Environmental Significance:

- Road transport accounts for roughly **12% of India's energy-related carbon dioxide emissions** and contributes significantly to urban air pollution, making transport electrification important for India's decarbonisation pathway.
- Electric mobility can reduce tailpipe emissions and, when combined with a cleaner electricity mix, contribute to lower lifecycle emissions.

Energy Security:

- Road transport consumes approximately **70% of India's diesel and 99.6% of petrol**, making transport electrification relevant to reducing dependence on imported crude oil.
- Reduced oil dependence can strengthen **energy security, improve external-sector resilience and reduce exposure to international crude-price volatility**.

Economic and Industrial Significance:

- The automotive sector contributes approximately **7.1% of India's GDP**, accounts for nearly half of manufacturing GDP and supports around **19 million direct and indirect jobs**.

- EV transition can therefore simultaneously promote **industrial modernisation, clean-technology innovation, domestic manufacturing, skilled employment and new business models**.
- India's large two-wheeler and three-wheeler markets provide a distinctive pathway for electrification because these segments have high utilisation and are particularly relevant to urban and commercial mobility.

Way Forward:

Shift from Policy Formulation to Implementation:

- States should move beyond purchase subsidies towards **charging infrastructure, building regulations, fleet electrification, financing mechanisms, public transport electrification and regulatory enforcement**.
- Performance monitoring should focus on actual outcomes such as EV adoption, charger availability, utilisation rates, domestic manufacturing and innovation rather than merely counting notified policies.

Build an Integrated Charging Ecosystem:

- States should develop **interoperable charging networks, single-window approvals, suitable land policies, reliable electricity supply and renewable-energy integration**.
- Charging infrastructure should be planned along urban corridors, highways, public transport routes and commercial mobility clusters to reduce range anxiety and improve utilisation.

Strengthen Domestic Value Chains:

- India needs greater investment in **battery cells, recycling, battery management systems, power electronics, motors, charging equipment and critical-mineral supply chains**.
- Research partnerships between **universities, industry, startups and government institutions** can strengthen indigenous technological capabilities.

Promote Inclusive and Sustainable Mobility:

- EV policies should address the needs of **low-income users, commercial drivers, public transport operators and rural areas**, rather than focusing only on private passenger vehicles.
- Electrification of buses, shared mobility and commercial three-wheelers can produce wider public benefits through lower operating costs and reduced urban pollution.

Value Addition for UPSC:

Key Data Points:

- **IEMI 2025 Top Performer:** Delhi, score **84**.
- **Second and Third:** Maharashtra **78**, Karnataka **73**.
- **India's EV Penetration:** **8.25% in 2025-26**, compared with 0.5% in 2018.
- **EVs on Indian Roads:** More than **8.7 million** in 2025-26.
- **EV Registrations in 2025-26:** Nearly **2.5 million**.
- **Public Charging Stations:** Around **29,000** by June 2025.
- **PM E-DRIVE Charging Allocation:** **₹2,000 crore**.
- **Road Transport's Energy-Related CO₂ Share:** Roughly **12%**.
- **Automotive Sector Contribution:** Approximately **7.1% of GDP**.
- **States and UTs with Active EV Policies:** **26 out of 36** by December 2025.

UPSC Linkages:

- **Environment:** Decarbonisation of transport, urban air pollution and renewable-energy integration.
- **Economy:** Import substitution, industrial policy, employment generation and domestic value-chain development.
- **Essay:** Electric mobility as a convergence of **environmental sustainability, energy security, technological innovation and inclusive economic growth.**

Mains-Ready Conclusion:

- The **India Electric Mobility Index 2025** shows that India's EV transition is progressing but remains geographically and institutionally uneven.
- The next phase must move beyond policy notification towards **effective implementation, reliable charging infrastructure, domestic manufacturing, technological innovation and inclusive adoption.**
- A coordinated approach involving the Centre, States, industry, research institutions and consumers can make electric mobility an instrument of **decarbonisation, energy security, industrial competitiveness and Viksit Bharat 2047.**

National Policy on Geothermal Energy: India's Roadmap for Harnessing Earth's Heat for Clean and Reliable Energy

Recent Developments:

- The **Ministry of New and Renewable Energy (MNRE)** notified India's **first National Policy on Geothermal Energy** on **15 September 2025**, creating a national framework for exploring, developing and utilising geothermal resources.
- The policy seeks to integrate geothermal energy into India's renewable-energy mix and support the country's **Net Zero emissions target by 2070** through research, technology development, capacity building, investment and partnerships.
- As an initial step, the government sanctioned **five pilot and resource-assessment projects** to evaluate India's geothermal potential and technological feasibility.
- In December 2025, the government stated that India had cooperation mechanisms with **Australia, Iceland, Saudi Arabia and the United States** for advancing geothermal technologies and knowledge exchange.

Understanding Geothermal Energy:***Definition and Geological Basis:***

- **Geothermal energy** refers to the heat stored beneath the Earth's surface, which originates from residual heat from Earth's formation and the **radioactive decay of naturally occurring isotopes.**
- The temperature of the Earth generally increases with depth, creating a **geothermal gradient** that can be exploited through wells, hot-water reservoirs and engineered geothermal systems.
- Unlike solar and wind energy, geothermal energy is relatively **independent of weather conditions**, making it suitable for continuous and dependable energy supply.

Major Types and Applications:

- **High-enthalpy resources**, generally associated with volcanic regions, geysers and high-temperature reservoirs, are particularly suitable for **electricity generation**.
- **Low- to medium-enthalpy resources** can support direct-use applications such as **heating, cooling, agriculture, aquaculture, food processing and ground-source heat pumps**.
- **Ground Source Heat Pumps (GSHPs)** can use relatively stable underground temperatures for building heating and cooling, expanding geothermal applications beyond electricity generation.
- Emerging technologies such as **Enhanced Geothermal Systems (EGS)** and **Advanced Geothermal Systems (AGS)** can potentially expand geothermal deployment to areas without easily accessible conventional reservoirs.

National Policy on Geothermal Energy, 2025:

Vision and Objectives:

- The policy aims to establish **geothermal energy as a major pillar of India's renewable-energy sector**, while strengthening energy security and supporting sustainable development.
- It promotes research in **resource assessment, exploration, drilling, reservoir management, cost-effective power generation and direct-use technologies**.
- It seeks to develop an enabling ecosystem involving **government institutions, research organisations, private developers, international partners and the oil and gas sector**.
- The policy also promotes geothermal applications in **electricity generation, space heating and cooling, agriculture, tourism, aquaculture and desalination**.

Implementation and Investment Framework:

- MNRE will provide the central policy framework and promote **inter-ministerial coordination, international cooperation, capacity building and adoption of global best practices**.
- **Pilot projects** and research initiatives will help reduce technological and commercial uncertainties before large-scale deployment.
- Financial support can be facilitated through **concessional financing, renewable-energy institutions and development-finance mechanisms**, particularly for early-stage exploration and demonstration.
- The policy encourages **public-private partnerships, joint ventures and international technology partnerships** to mobilise capital and technical expertise.
- **Centres of Excellence** and knowledge-sharing mechanisms can strengthen domestic expertise in drilling, reservoir engineering, geothermal modelling and project management.

Technology and Resource Development:

- The policy covers the complete development cycle, including **resource assessment, exploration, drilling, feasibility studies, power production and direct-use applications**.
- It encourages innovative approaches such as **hybrid geothermal-solar systems**, EGS and AGS to improve resource utilisation.
- **Abandoned oil and gas wells** can potentially be repurposed for geothermal energy, allowing existing subsurface knowledge and infrastructure to be utilised.
- Mineral by-products associated with geothermal resources can also create opportunities for **resource recovery**, subject to applicable regulatory and royalty provisions.

India's Geothermal Potential:

Resource Base and Geothermal Provinces:

- According to the **Geothermal Atlas of India, 2022**, India has an estimated theoretical geothermal resource potential of approximately **10,600 MW**.
- The **Geological Survey of India (GSI)** has mapped and documented **381 hot springs** across the country, demonstrating the geographical spread of geothermal resources.
- India has identified **10 geothermal provinces**, including the Himalayan region, Cambay Basin, Aravalli region, Mahanadi Basin and Godavari Basin.
- **42 geothermal manifestations** have been identified as promising areas for geothermal power and direct-heat applications and have been included for further exploration under the national policy.
- Important prospective areas include **Puga and Chumathang in Ladakh, Manikaran in Himachal Pradesh, Tapovan in Uttarakhand, Bakreshwar in West Bengal, Tattapani in Chhattisgarh and Cambay Basin in Gujarat**.

Significance for India:

Energy Security and Climate Action:

- Geothermal energy can diversify India's renewable-energy portfolio beyond **solar, wind, hydropower and bioenergy**, reducing excessive dependence on any single renewable source.
- Its potential for relatively continuous generation can complement variable renewable sources and contribute to **grid reliability and firm clean power**.
- Geothermal heating and cooling can directly reduce fossil-fuel use in buildings, agriculture and industries, thereby supporting **decarbonisation**.
- Greater use of indigenous geothermal resources can strengthen **energy security** and reduce exposure to imported fossil-fuel prices.

Regional and Economic Development:

- Geothermal development can create employment in **geological surveys, drilling, engineering, construction, plant operation and maintenance**.
- Geothermal applications can support local economic activities such as **greenhouses, cold storage, aquaculture, tourism and food processing**.
- Special attention to **remote, high-altitude and North-Eastern regions** can help connect clean-energy development with regional infrastructure and livelihood opportunities.

Challenges in Geothermal Development:

Economic and Geological Constraints:

- **High upfront costs** for exploration and drilling create significant financial risks because commercial viability may remain uncertain until subsurface resources are confirmed.
- Geothermal resources are **site-specific**, requiring detailed geological, geophysical and geochemical assessment before development.
- India still has limited experience with **deep drilling, reservoir management and commercial-scale geothermal projects**, creating technology and skill gaps.
- Complex geological conditions in the **Himalayan and other tectonically active regions** can make exploration and resource assessment more difficult.

- Environmental risks such as **induced seismicity, land subsidence and groundwater contamination** require appropriate monitoring, reinjection and environmental safeguards.

Institutional and Infrastructure Gaps:

- India needs stronger coordination among **MNRE, GSI, research institutions, state governments, oil and gas companies and financial institutions.**
- A comprehensive **national geothermal data repository** can reduce information asymmetry and improve resource assessment for investors.
- Clear licensing, land access, environmental approvals and grid connectivity are necessary to reduce project-development delays.

Way Forward:

Building a Competitive Geothermal Ecosystem:

- Move from **resource identification to commercial demonstration** through targeted pilot projects and transparent performance evaluation.
- Develop indigenous capabilities in **deep drilling, reservoir engineering, EGS, AGS, geothermal heat pumps and subsurface modelling.**
- Establish **risk-sharing financial mechanisms** for exploration-stage projects because geological uncertainty is a major barrier to private investment.
- Promote **single-window clearances, predictable regulations and long-term project frameworks** to improve investor confidence.
- Encourage collaboration with countries possessing advanced geothermal expertise while simultaneously building **Indian technological capacity.**
- Integrate geothermal projects with **solar, storage and existing oil-and-gas infrastructure** wherever technically and economically feasible.

Value Addition for UPSC:

Prelims Facts:

- **Nodal Ministry:** Ministry of New and Renewable Energy.
- **National Policy:** National Policy on Geothermal Energy, notified in **2025.**
- **Estimated theoretical potential:** Approximately **10,600 MW.**
- **Hot springs documented by GSI:** **381.**
- **Geothermal provinces:** **10.**
- **Promising geothermal manifestations:** **42.**
- **Important technologies:** EGS, AGS and GSHPs.
- **Policy relevance:** Net Zero 2070, energy security and renewable-energy diversification.

Mains Linkages:

- **Environment:** Decarbonisation, low-carbon energy transition and climate-resilient development.
- **Essay:** “India’s energy transition requires not only more renewable energy, but also greater diversity, reliability and technological innovation.”

Conclusion:

- India's geothermal resources remain **largely underutilised despite substantial theoretical potential**.
- The National Policy on Geothermal Energy provides the institutional foundation for moving from scattered exploration towards systematic development.
- Its long-term success will depend on **scientific resource assessment, technological innovation, risk-sharing finance, regulatory clarity and responsible environmental management**, enabling geothermal energy to complement India's rapidly expanding renewable-energy ecosystem.

SEMICON India 2026: India's Transition from Electronics Manufacturing to a Complete Semiconductor Ecosystem

Recent Developments:

- Prime Minister Narendra Modi inaugurated **SEMICON India 2026** at **Yashobhoomi, Dwarka, New Delhi**, on **17 September 2026**, bringing together global semiconductor companies, policymakers, industry leaders, investors, academia and students.
- The **fifth edition** of SEMICON India is being held from **17–19 September 2026** with the theme **"Silicon to Systems: Building the Ecosystem"**, highlighting India's transition from semiconductor manufacturing towards an integrated ecosystem covering design, fabrication, packaging, talent and innovation.
- The event comes amid the expansion of India's semiconductor policy framework through **Semicon 2.0**, approved in July 2026 with an outlay of **₹1,27,500 crore**. –

Why Are Semiconductors a Foundational Technology?***Strategic and Technological Importance:***

- **Semiconductors** are the foundation of modern digital and industrial systems, powering **automobiles, telecommunications, healthcare, defence, aerospace, consumer electronics, satellites and artificial intelligence**.
- Advanced chips contain **billions of transistors** within extremely small areas, enabling high-performance computing, artificial intelligence, advanced telecommunications and other emerging technologies.
- The semiconductor industry has become strategically important because disruptions in chip supplies can affect multiple downstream industries simultaneously.
- The COVID-19 pandemic highlighted the vulnerability of geographically concentrated semiconductor supply chains and encouraged countries to develop **domestic manufacturing capabilities and resilient supply networks**.
- The growing convergence of **semiconductors and artificial intelligence** is further increasing demand for specialised processors, high-performance computing and advanced computing infrastructure.

SEMICON India 2026:

Purpose and Significance:

- SEMICON India is an **annual flagship semiconductor conference and exhibition** that provides a platform for India's semiconductor ecosystem to engage with global industry, policymakers, researchers and investors.
- The first edition was held in **2022 at Bengaluru**, while the **2026 edition is the fifth edition** of the event.
- The 2026 theme, "**Silicon to Systems: Building the Ecosystem**," reflects a broader approach in which India seeks to develop capabilities across the semiconductor value chain rather than focusing only on fabrication.
- The ecosystem approach covers **chip design, fabrication, advanced packaging, testing, equipment, materials, research, innovation and skilled human resources**.

India's Semiconductor Ecosystem: From Manufacturing to Value-Chain Integration

Growth of Electronics Manufacturing:

- India's electronics manufacturing sector has expanded rapidly, with electronics production increasing from around **₹1.9 lakh crore in 2014–15 to ₹13.11 lakh crore in 2025–26**.
- Electronics exports increased from around **₹38,000 crore in 2014–15 to ₹4.24 lakh crore in 2025–26**, demonstrating deeper integration with global electronics supply chains.
- Mobile-phone manufacturing increased from approximately **₹18,000 crore in 2014–15 to ₹6.27 lakh crore in 2025–26**, while smartphone exports rose from around **₹1,500 crore to ₹2.59 lakh crore**.
- India has moved from substantial dependence on imported mobile phones towards domestic production, with approximately **99% of domestic mobile-phone demand being met through local manufacturing**.
- India has emerged as the **second-largest mobile-phone manufacturer globally by volume**, providing an industrial base for moving towards higher-value electronics and semiconductor manufacturing.
- The broader electronics manufacturing ecosystem has also generated substantial employment and created capabilities in assembly, components, logistics, testing and supply-chain management.

Semicon India Programme:

Semicon India 1.0:

- The **Semicon India Programme** was approved in **2021** with an outlay of **₹76,000 crore** to establish a sustainable semiconductor and display-manufacturing ecosystem in India.
- The programme supports the broader semiconductor value chain, including **semiconductor fabs, display fabs, compound semiconductors, silicon photonics, sensors, advanced packaging, testing, equipment, materials and skilled talent**.
- Its ecosystem-based approach seeks to reduce excessive dependence on external supply chains while encouraging domestic manufacturing, design capabilities and technological innovation.

Semicon 2.0:

- The Union Cabinet approved **Semicon 2.0 on 15 July 2026** with a total outlay of **₹1,27,500 crore**, providing long-term support for India's semiconductor design and manufacturing ecosystem.
- Semicon 2.0 expands the earlier framework through **six strategic pillars: design, machines and materials, new fabs, advanced packaging, research and development, and talent development**.
- The programme seeks to build capabilities across the semiconductor chain, from **raw materials and equipment to design, fabrication, packaging and finished chips**.

- The shift is therefore from establishing isolated manufacturing facilities towards developing a **complete and globally competitive semiconductor ecosystem**.

Building India's Chip-Design and Talent Ecosystem:

Chips to Startup and Design Linked Incentive:

- The **Chips to Startup Programme** seeks to strengthen semiconductor design capabilities in academic institutions by providing access to **Electronic Design Automation tools, training facilities and design infrastructure**.
- The government has expanded access to advanced design tools across hundreds of academic institutions, enabling students and researchers to gain practical exposure to semiconductor design.
- The **Design Linked Incentive Scheme** supports domestic semiconductor design companies, startups and micro, small and medium enterprises developing integrated circuits, chipsets, system-on-chip products and related technologies.
- By **April 2026, 211 chips had been taped out by 75 institutions**, demonstrating the expansion of indigenous chip-design capabilities.
- **7 chips** had also been fabricated at different technology nodes, including nodes up to **12 nanometres**, indicating progress from design towards physical manufacturing.

ChipIN Centre:

- The **ChipIN Centre at C-DAC** provides shared access to semiconductor design tools, fabrication services and specialised training, reducing the entry barriers faced by academic institutions and startups.
- Such shared infrastructure allows organisations with limited resources to access expensive design and fabrication facilities, thereby supporting **innovation, skill development and indigenous intellectual property creation**.
- The initiative strengthens the connection between **academic research, chip design, fabrication and commercialisation**, which is essential for building a sustainable semiconductor ecosystem.

Semiconductor Supply-Chain Resilience and Geopolitics:

Pax Silica and Strategic Partnerships:

- India has joined the **Pax Silica coalition**, which focuses on strengthening resilience across the strategic **silicon supply chain** and related technologies.
- The broader concept encompasses **critical minerals, semiconductor manufacturing, advanced artificial intelligence systems and supporting infrastructure**.
- International partnerships can help India diversify sources of critical inputs, access advanced technologies and reduce vulnerability to disruptions in concentrated global supply chains.
- Semiconductor cooperation has therefore acquired a wider **geoeconomic and national-security dimension**, extending beyond conventional industrial policy.

Challenges for India's Semiconductor Ambitions:

Technology, Supply Chains and Skills:

- Semiconductor manufacturing requires **high capital intensity, advanced technology, reliable utilities, specialised equipment and highly skilled human resources**, creating significant entry barriers.

- India needs deeper domestic capabilities in **semiconductor equipment, specialty chemicals, materials, gases, wafers and advanced packaging** to increase domestic value addition.
- Dependence on imported critical inputs can create vulnerabilities even when chip fabrication capacity is established domestically.
- India must continuously strengthen **research and development, semiconductor intellectual property, advanced-node design and process engineering** to remain technologically competitive.
- Sustained development of specialised talent is necessary because semiconductor manufacturing involves highly technical disciplines such as **microelectronics, materials science, process engineering, chip design and semiconductor physics**.

Way Forward:

Building a Globally Competitive Semiconductor Ecosystem:

- India should move beyond assembly-led electronics manufacturing towards **higher domestic value addition in design, components, fabrication, packaging, equipment and materials**.
- Semicon 2.0 should be implemented through coordinated development of **fabs, advanced packaging, semiconductor equipment, materials, design capabilities, research infrastructure and skilled manpower**.
- Greater integration between **universities, research institutions, startups and industry** can accelerate indigenous semiconductor intellectual property and commercialisation.
- India should strengthen **critical-mineral security, supply-chain diversification and strategic international partnerships** while developing domestic capabilities.
- Semiconductor policy should also be linked with the **Electronics Components Manufacturing Scheme**, which aims to deepen domestic production of critical components and strengthen electronics supply-chain resilience.
- A resilient semiconductor ecosystem will require long-term policy stability, infrastructure reliability, technology partnerships and continuous investment in **research, talent and innovation**.

Value Addition for UPSC:

Prelims Facts:

- **SEMICON India 2026:** Fifth edition, held at Yashobhoomi, Dwarka, from 17–19 September 2026.
- **Theme:** “Silicon to Systems: Building the Ecosystem.”
- **Semicon India Programme:** Approved in 2021 with an outlay of ₹76,000 crore.
- **Semicon 2.0:** Approved in July 2026 with an outlay of ₹1,27,500 crore.
- **Major pillars of Semicon 2.0:** Design, machines and materials, new fabs, advanced packaging, research and development, and talent development.
- **Key initiatives:** Chips to Startup, Design Linked Incentive, ChipIN Centre and India Semiconductor Mission.
- **Strategic linkages:** Artificial intelligence, critical minerals, advanced manufacturing, national security and resilient global supply chains.

Mains Linkages:

- **Science and Technology:** Artificial intelligence, chip design, advanced packaging, fabrication and semiconductor intellectual property.
- **Economy:** Manufacturing, exports, employment, foreign investment, domestic value addition and integration into global value chains.

- **Essay:** “Technological self-reliance in the 21st century depends not merely on consuming advanced technologies, but on developing the capabilities to design, manufacture and innovate them.”

Conclusion:

- **SEMICON India 2026** reflects India’s broader transition from an electronics assembly and manufacturing base towards an integrated **semiconductor ecosystem**.
- The combination of **Semicon 1.0, Semicon 2.0, indigenous chip design, advanced packaging, talent development and international partnerships** can strengthen India’s position in the global semiconductor value chain.
- The long-term objective should be to combine manufacturing scale with **technological depth, domestic value addition, supply-chain resilience and indigenous innovation**.

1991 India–Pakistan Agreement: Maritime Confidence-Building, Naval Safety and Risks of Escalation

Recent Developments:

- A naval incident involving **PNS Hunain** and an Indian Navy warship in the **North Arabian Sea** has brought renewed attention to the **1991 India–Pakistan Agreement on Advance Notice on Military Exercises, Manoeuvres and Troop Movements**.
- According to India, the Pakistani naval vessel approached an Indian warship at high speed during a **routine surveillance mission** and manoeuvred unsafely, resulting in a minor collision; India stated that the incident occurred in international waters and that its vessel suffered no damage.
- Pakistan has presented a different account, stating that the Indian vessel entered an area within Pakistan’s **Exclusive Economic Zone** during its naval exercise and that the incident involved a dangerous manoeuvre by the Indian vessel. The competing accounts mean that the precise circumstances and responsibility remain disputed.
- India stated that the conduct was **unacceptable and unprofessional** and referred to **Article 10 of the 1991 Agreement**, which requires naval ships and submarines of the two countries to maintain a minimum separation of **3 nautical miles** in international waters.

The 2011 Naval Precedent:

PNS Babur–INS Godavari Incident:

- A similar naval encounter occurred in **June 2011**, when Pakistani warship **PNS Babur** came into contact with Indian Navy frigate **INS Godavari** in the Gulf of Aden.
- The incident caused minor damage to the Indian vessel’s **helicopter safety net** and was subsequently taken up through diplomatic channels.
- The Ministry of External Affairs recorded India’s protest over the Pakistani vessel’s conduct and specifically referred to **Article 10 of the 1991 Agreement**.
- The 2011 episode demonstrates that the 1991 agreement continues to provide a reference point for addressing potentially dangerous naval encounters between the two countries.

Maritime Zones under UNCLOS:

Territorial Sea and Exclusive Economic Zone:

- Under the **United Nations Convention on the Law of the Sea**, a coastal state's **territorial sea extends up to 12 nautical miles** from its baselines and forms part of the state's sovereign territory, subject to applicable international law.
- **1 nautical mile equals 1.852 kilometres**, making 12 nautical miles approximately **22.2 kilometres**.
- The **Exclusive Economic Zone extends up to 200 nautical miles** from the baselines, within which the coastal state has **sovereign rights over natural resources** and jurisdiction over specified activities.
- An EEZ should not be equated with territorial waters because other states retain certain freedoms, including navigation, within the EEZ under international law.
- The distinction between **territorial sea, EEZ and international waters** is therefore important when assessing naval activities and competing maritime claims.

The 1991 India–Pakistan Agreement Explained:

Purpose and Confidence-Building Framework:

- The **Agreement between India and Pakistan on Advance Notice on Military Exercises, Manoeuvres and Troop Movements** was signed in **April 1991** to reduce the possibility of crises arising from the misinterpretation of military activities.
- The agreement forms part of the broader **confidence-building measures** developed by India and Pakistan to reduce military risks and improve strategic stability.
- It requires both sides to provide specified advance information about certain military exercises and establishes rules intended to prevent dangerous military encounters.

Major Provisions:

- Major military exercises close to the other country's territory are subject to agreed restrictions, notification requirements and procedures designed to reduce uncertainty.
- Specified exercises require different periods of advance notification, including **15 days for certain air and naval exercises, 60 days for corps-level exercises and 90 days for army-level exercises**.
- Either country may seek clarification regarding the **assembly, direction, extent and duration** of military exercises.
- A major naval exercise is defined in the agreement in terms of the participation of **6 or more ships** of destroyer or frigate size and above exercising together and crossing into the other country's EEZ.
- **Article 10** requires naval ships and submarines of India and Pakistan to maintain a minimum separation of **3 nautical miles** from one another in international waters to reduce the risk of accidents.
- The agreement also contains provisions concerning military aircraft, including restrictions on combat aircraft operating close to the other country's airspace and specified exceptions for aircraft operating from designated locations.
- On the same day, the two countries also signed the **Agreement on Prevention of Air Space Violations and for Permitting Over Flights and Landings by Military Aircraft**, creating a parallel framework for reducing risks from military aviation.

Why Was the 1991 Agreement Signed?

Strategic Context of the 1980s:

- The 1980s witnessed the development of several **India–Pakistan confidence-building measures** against the background of heightened regional tensions and military competition.
- The development of **nuclear weapons programmes** in both countries increased the potential consequences of military miscalculation and strengthened the need for mechanisms to prevent unintended escalation.
- The **Soviet intervention in Afghanistan in 1979** altered South Asian security dynamics and increased the importance of stability along Pakistan's eastern frontier.
- The immediate military trigger was the large-scale **Exercise Brass Tacks**, conducted by India in **1986–87** near the Pakistan border.
- The exercise involved substantial military mobilisation, including **armoured and mechanised formations**, alongside air and naval activities, generating serious Pakistani security concerns.
- The episode demonstrated how large military exercises can create uncertainty about intentions and highlighted the need for **prior notification, transparency and communication mechanisms**.

Importance of the Agreement for Strategic Stability:

Preventing Miscalculation:

- Military vessels and aircraft frequently operate in proximity to one another, making clear operational rules important for preventing **accidental encounters from becoming military crises**.
- The 1991 agreement provides a rules-based framework for communicating military activities and maintaining minimum separation during potentially sensitive encounters.
- Such arrangements are particularly significant in South-Asia because India and Pakistan are **nuclear-armed states**, making escalation management an important component of regional security.
- Confidence-building agreements cannot eliminate strategic rivalry, but they can reduce the probability that **misperception, miscalculation or an accident** will trigger an unintended escalation.

Naval Ramming and Maritime Encounters:

Historical Context:

- **Ramming** is an ancient naval tactic that was used by Greek and Roman fleets, where reinforced vessels attempted to damage or sink enemy ships through direct impact.
- The tactic reappeared in modern naval warfare, including the **Battle of Hampton Roads in 1862**, during the American Civil War, when CSS Virginia used its ram against USS Cumberland.
- Naval collisions and deliberate vessel contact also occurred during the **World Wars** and later maritime disputes, including the **Cod Wars** between Iceland and the United Kingdom.
- In the modern era, close-quarters manoeuvring can have significant strategic implications because sophisticated warships operate with advanced sensors, weapons systems and aircraft.

Grey-Zone Activities and Maritime Security:

Concept of Grey-Zone Operations:

- **Grey-zone activities** refer to coercive or competitive actions that remain below the conventional threshold of open armed conflict while attempting to secure strategic objectives.

- Maritime grey-zone activities can include **dangerous manoeuvring, ramming, blocking, water-cannon use, maritime militia operations and coercive law-enforcement actions**.
- Such activities can create ambiguity over whether an incident constitutes an accident, coercion or a deliberate use of force.
- Similar patterns have been observed in maritime disputes in the **South China Sea**, particularly in encounters involving Chinese and Philippine vessels.
- However, the classification of any particular India–Pakistan naval incident as a **grey-zone operation** **requires evidence regarding intent**, and the current 2026 incident has competing official accounts.

Implications for India and Pakistan:

Maritime and Diplomatic Dimensions:

- The Arabian Sea is strategically important because it connects the **Indian Ocean with the Persian Gulf and wider West Asian maritime routes**.
- Naval surveillance, exercises and commercial shipping therefore increase the importance of predictable rules for military encounters.
- The 2026 incident also demonstrates the importance of maintaining **military-to-military communication channels** alongside diplomatic mechanisms.
- Prompt diplomatic engagement can help prevent an isolated maritime accident from becoming a broader security crisis.
- Existing agreements should be complemented by clearer procedures for **incident reporting, investigation, deconfliction and emergency communication**.

Way Forward:

Strengthening Maritime Confidence-Building Measures:

- India and Pakistan should continue using existing bilateral mechanisms to clarify incidents and prevent **miscalculation and unintended escalation**.
- Both sides can strengthen practical maritime protocols covering **safe manoeuvring, communication, separation distances, incident investigation and emergency signalling**.
- Regular professional interaction between naval authorities, where politically feasible, can improve mutual understanding of operational procedures.
- Greater transparency regarding major naval exercises can reduce uncertainty and prevent routine deployments from being misinterpreted.
- The principles of **UNCLOS, navigational safety and established international maritime practices** should remain central to managing naval encounters.
- Confidence-building measures should be viewed as **risk-reduction mechanisms rather than substitutes for resolving underlying bilateral disputes**.

Value Addition for UPSC:

Prelims Facts:

- **1991 Agreement:** Advance Notice on Military Exercises, Manoeuvres and Troop Movements.
- **Article 10:** Minimum **3 nautical miles** separation between Indian and Pakistani naval ships and submarines in international waters.
- **Territorial sea:** Up to **12 nautical miles**.
- **Exclusive Economic Zone:** Up to **200 nautical miles**.

- **1 nautical mile:** 1.852 kilometres.
- **2011 precedent:** PNS Babur–INS Godavari incident in the Gulf of Aden.
- **Major historical trigger:** Exercise Brass Tacks, 1986–87.
- **Related 1991 agreement:** Prevention of Air Space Violations and arrangements for overflights and landings by military aircraft.

Mains Linkages:

- **International Relations:** UNCLOS, maritime zones, strategic stability and rules-based maritime conduct.
- **Security:** Grey-zone activities, escalation management, military transparency and crisis communication.
- **Essay:** *“In a nuclearised neighbourhood, preventing miscalculation can be as important as deterring deliberate aggression.”*

Conclusion:

- The 2026 naval collision has renewed attention to the **1991 India–Pakistan confidence-building framework**, particularly **Article 10**.
- While India and Pakistan have presented different accounts of the incident, the episode demonstrates the continuing importance of clearly defined operational rules and communication mechanisms at sea.
- For two nuclear-armed neighbours, strengthening **maritime safety, transparency, crisis communication and confidence-building measures** remains essential to ensure that accidental encounters do not develop into wider strategic crises.

QUESTIONS

1. Consider the following statements regarding the Global Gender Gap Index 2026 sub-indices and parameters for India:

- (1) India has achieved full parity (100%) in tertiary education enrolment.
- (2) India's political empowerment subindex rank sits in the top 50 globally.
- (3) The sub-index for Economic Participation and Opportunity records a parity score above 50%.
- (4) India maintains full parity in secondary education enrolment.
- (5) Women's representation at the ministerial level stands above 20% in 2026.

How many of the above statements are correct?

- (A) Only two
- (B) Only three
- (C) Only four
- (D) All five

2. Given below are two statements, one labeled as Assertion (A) and the other as Reason (R):

Assertion (A): High scores in 'Charging Infrastructure Readiness' in a state do not automatically translate into high immediate 'Transport Electrification Progress'.

Reason (R): EV adoption is constrained by multiple non-infrastructure factors including upfront purchase costs, availability of financing, consumer awareness, and vehicle segment choices.

Select the correct answer using the code below:

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is NOT the correct explanation of A.
- (C) A is true but R is false.
- (D) A is false but R is true.

3. Consider the following statements regarding geothermal energy potential and policy parameters in India:

- (1) According to the Geothermal Atlas of India, the country has an estimated theoretical geothermal potential of approximately 10,600 MW.
- (2) The Geological Survey of India (GSI) has documented over 300 hot springs spread across 10 geothermal provinces.
- (3) High-enthalpy geothermal resources are primarily utilized for direct-use applications like space heating and cold storage.
- (4) Repurposing abandoned oil and gas wells for geothermal energy extraction is permitted under India's National Policy on Geothermal Energy.
- (5) Ground Source Heat Pumps (GSHPs) rely on extreme atmospheric temperature fluctuations to generate baseload electricity.

How many of the above statements are correct?

- (A) Only two

- (B) Only three
- (C) Only four
- (D) All five

4. With reference to the 'Semicon 2.0' policy framework approved in July 2026, consider the following strategic pillars:

- (1) Semiconductor Design and Design Linked Incentives
- (2) Semiconductor Machines and Raw Materials
- (3) New Commercial Fabs and Advanced Packaging
- (4) Research and Development (R&D) and Talent Development

Which of the strategic pillars given above are formally included under Semicon 2.0?

- (A) 1 and 3 only
- (B) 2 and 4 only
- (C) 1, 2 and 3 only
- (D) 1, 2, 3 and 4

5. Consider the following statements regarding the 1991 India–Pakistan Agreement on Advance Notice on Military Exercises, Manoeuvres and Troop Movements:

- (1) Article 10 of the Agreement specifies that naval ships and submarines of both countries must maintain a minimum separation distance of 3 nautical miles in international waters.
- (2) Under the agreement, army-level military exercises require a prior advance notification period of 90 days.
- (3) The agreement defines a major naval exercise as one involving the joint exercise of 6 or more ships of destroyer or frigate size and above crossing into the other country's Exclusive Economic Zone (EEZ).
- (4) Advance notification for specified air and naval military exercises must be provided at least 30 days prior to commencement.
- (5) The agreement extends territorial sovereign rights over the Exclusive Economic Zone up to 200 nautical miles, prohibiting foreign foreign navigation without prior consent.

How many of the above statements are correct?

- (A) 1, 3 and 5 only
- (B) 2, 3 and 4 only
- (C) 1, 2 and 3 only
- (D) 3, 4 and 5 only

ANSWER KEY

1 – Answer (A), 2 – Answer (A), 3 – Answer (B), 4 – Answer (D), 5 – Answer (C)



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