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

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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.

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- 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.**