# Science & Technology · GS - III

**Strategic competition over advanced semiconductor technologies has transformed export controls into instruments of economic and national security policy. Examine their implications for global technology supply chains and discuss how India can strengthen its semiconductor ecosystem.**

| EXAM YEAR | PAPER | SUBJECT |
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| MARKS | WORD LIMIT |
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| 10 | ~150 words |

## Answer Hint

**Dual-use technology, export licensing, AI chips, geopolitical competition, supply-chain vulnerabilities, technological sovereignty, semiconductor fabrication, domestic research, international partnerships.**

## Model Answer

### Introduction

Semiconductors are critical to artificial intelligence, telecommunications, defence and modern manufacturing. Consequently, restrictions on advanced chip exports have become an important instrument of strategic competition.

### Implications of Export Controls

- **Supply-chain disruptions:** Restrictions can affect chip designers, manufacturers, distributors and downstream industries across countries.
- **Technological fragmentation:** Competing technology ecosystems may increase costs and reduce international interoperability.

- **National security:** Advanced processors have potential civilian and military applications, creating legitimate dual-use concerns.
- **Corporate governance:** Companies must strengthen compliance, end-user verification and regulatory oversight.

**India's Strategic Priorities**

India should accelerate semiconductor fabrication, packaging and testing capabilities through domestic investment and technology partnerships. Strengthening research institutions, developing skilled manpower and supporting indigenous chip design are equally important.

Diversified international partnerships and resilient supply chains can reduce excessive external dependence.

**Conclusion**

Semiconductor security requires balancing national security considerations with open technological cooperation. India must combine domestic capacity-building, innovation and strategic partnerships to achieve long-term technological resilience.

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