Science & Technology · GS - III

India aims to become a semiconductor manufacturing hub. What are the challenges faced by the semiconductor industry in India? Mention the salient features of the India Semiconductor Mission.

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MARKS	WORD LIMIT
15	~250 words

Answer Hint

Semiconductors, India Semiconductor Mission, ISM, semiconductor fabs, ATMP, OSAT, capital intensity, water, power, skilled manpower, supply chains, fiscal support

Model Answer

Introduction

Semiconductors are foundational to electronics, telecommunications, automobiles, defence and emerging technologies. India possesses a large electronics market and design talent but remains dependent on overseas semiconductor manufacturing.

1. Major challenges

1. Semiconductor fabrication requires extremely high capital investment and long gestation periods.
2. Reliable supplies of ultra-pure water, uninterrupted electricity and specialised gases are essential.
3. India faces gaps in semiconductor manufacturing equipment and specialised materials.
4. Advanced fabrication requires highly specialised engineering and research capabilities.
5. Global competition from established semiconductor ecosystems creates scale and cost disadvantages.
6. Integration with global supply chains and intellectual-property ecosystems remains challenging.

2. India Semiconductor Mission

The India Semiconductor Mission provides institutional and financial support for developing a semiconductor and display ecosystem. The programme supports semiconductor fabs, display fabs, compound semiconductors and ATMP/OSAT facilities, alongside semiconductor design.

The scheme provides fiscal assistance to eligible projects and seeks to establish a resilient domestic semiconductor ecosystem. The government has approved multiple semiconductor units under the programme, including fabrication and packaging projects.

3. Way forward

India needs sustained R&D, industry-academia collaboration, specialised skill development, reliable utilities, supply-chain diversification and integration with global manufacturers.

Conclusion

The semiconductor mission should be viewed not merely as a subsidy programme but as an ecosystem-building strategy combining manufacturing, design, materials, skills and technological innovation.

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